THIRD SERIES VOL 56 NUMBER 1 NOVEMBER 1948

THE JOURNAL OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS

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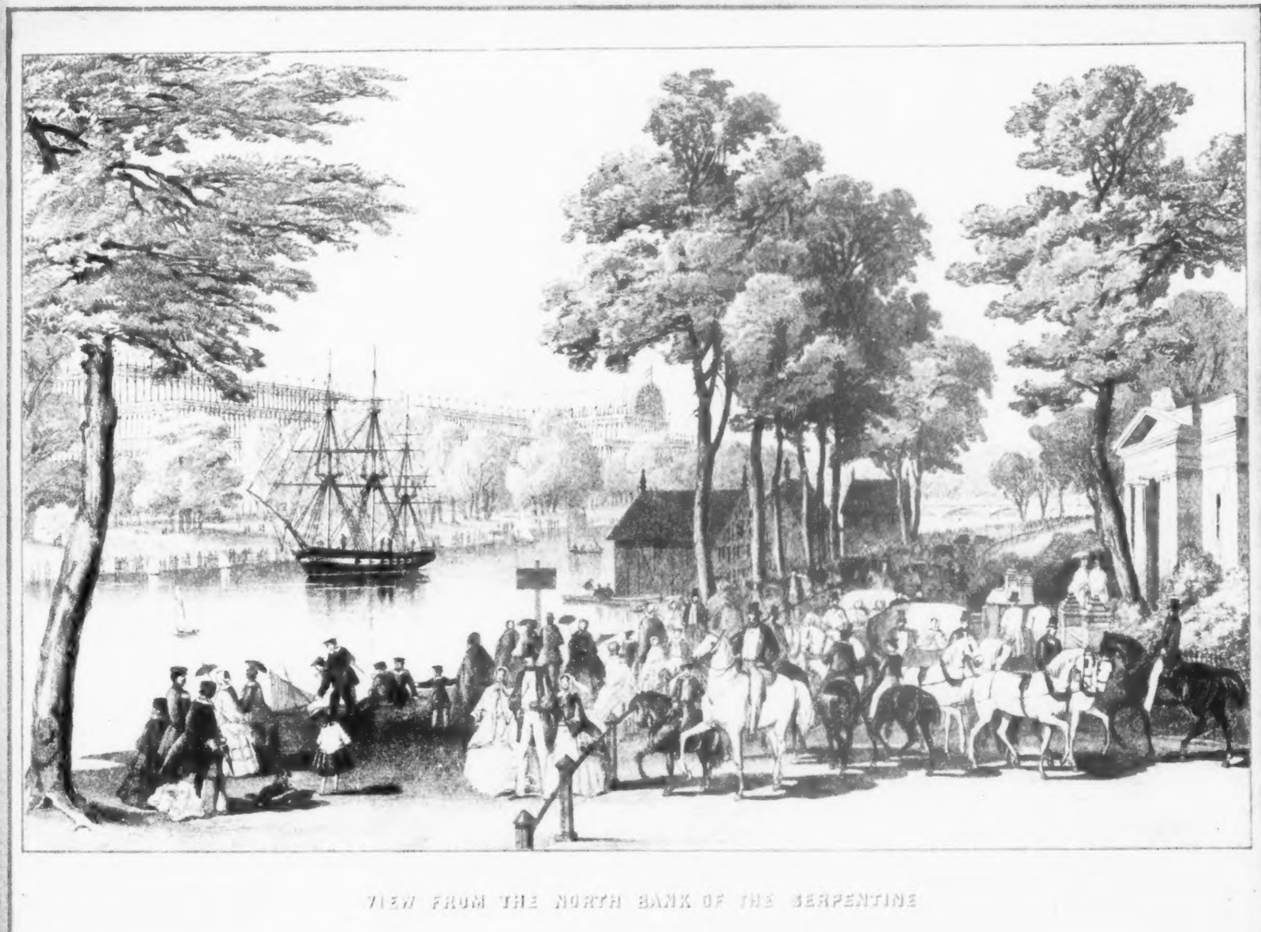

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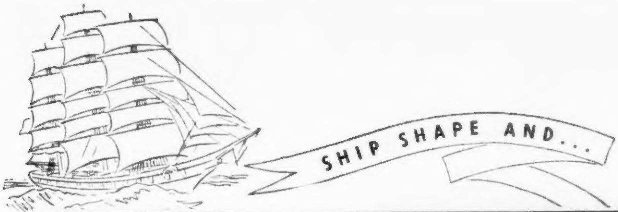

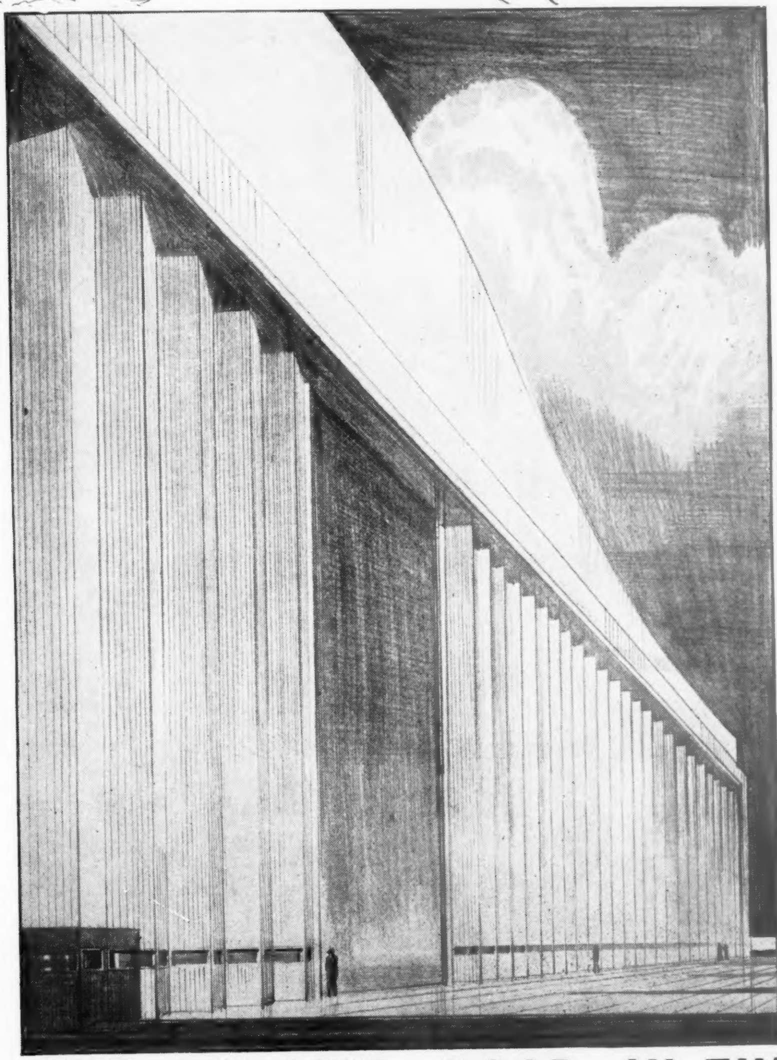

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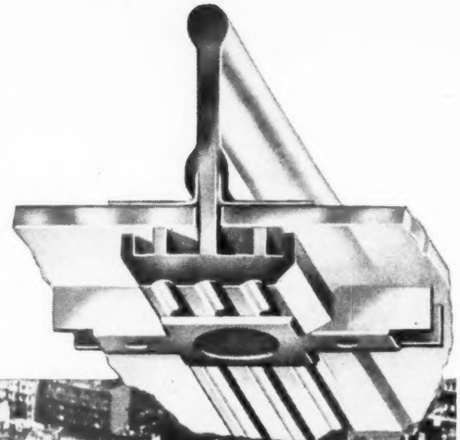

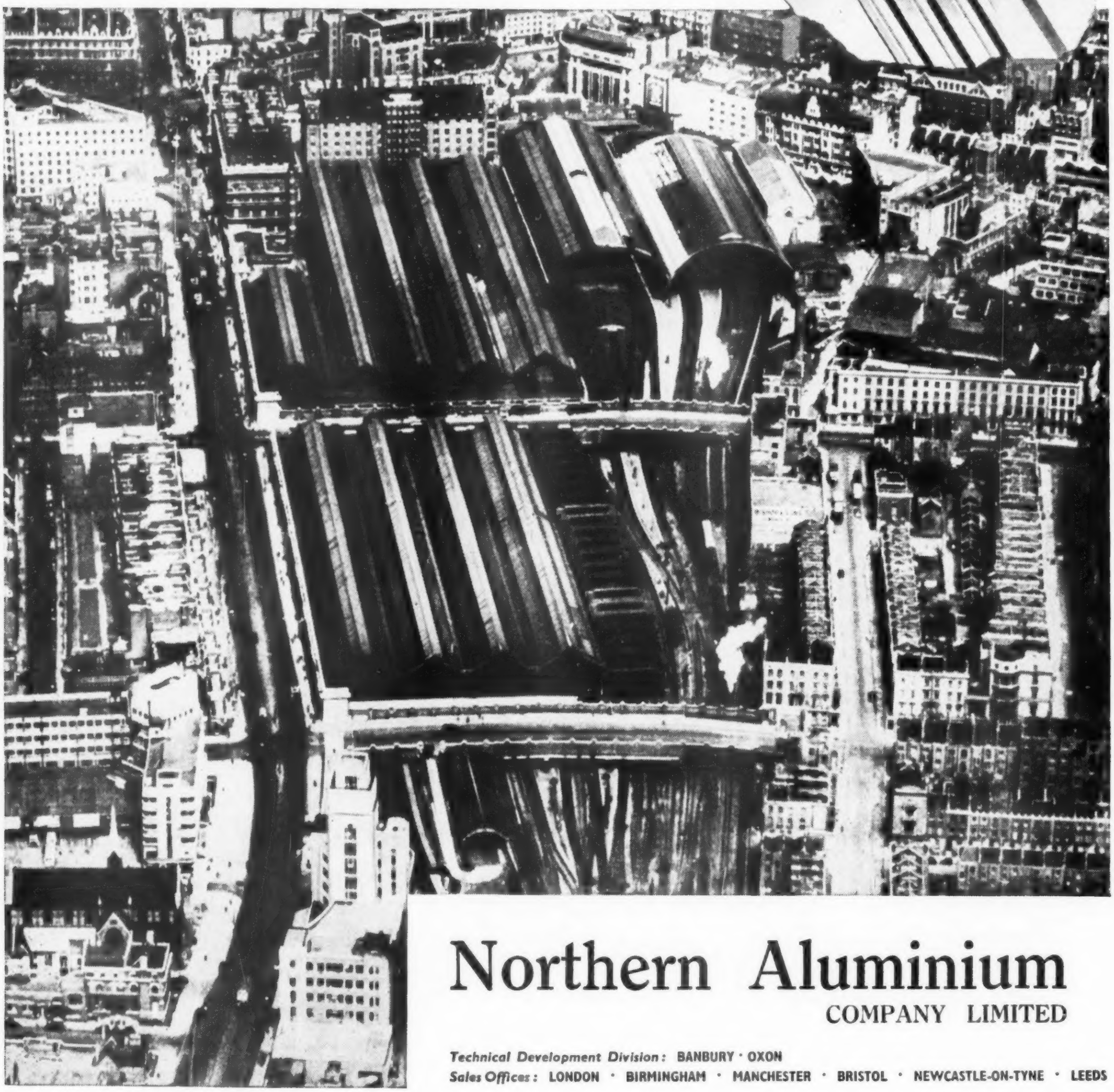

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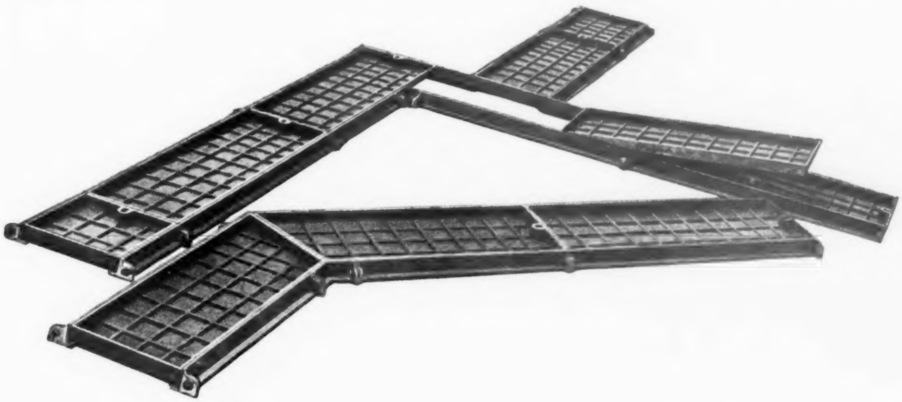

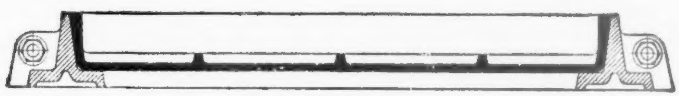

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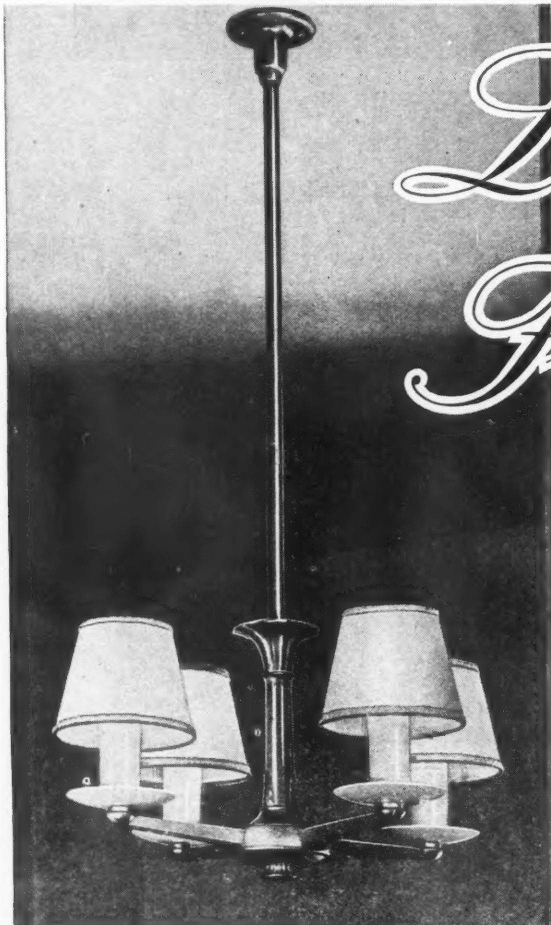

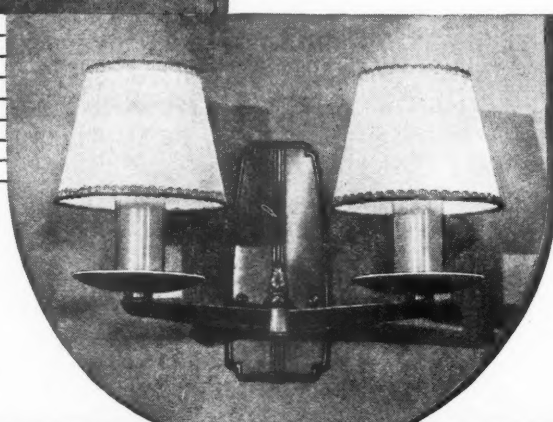

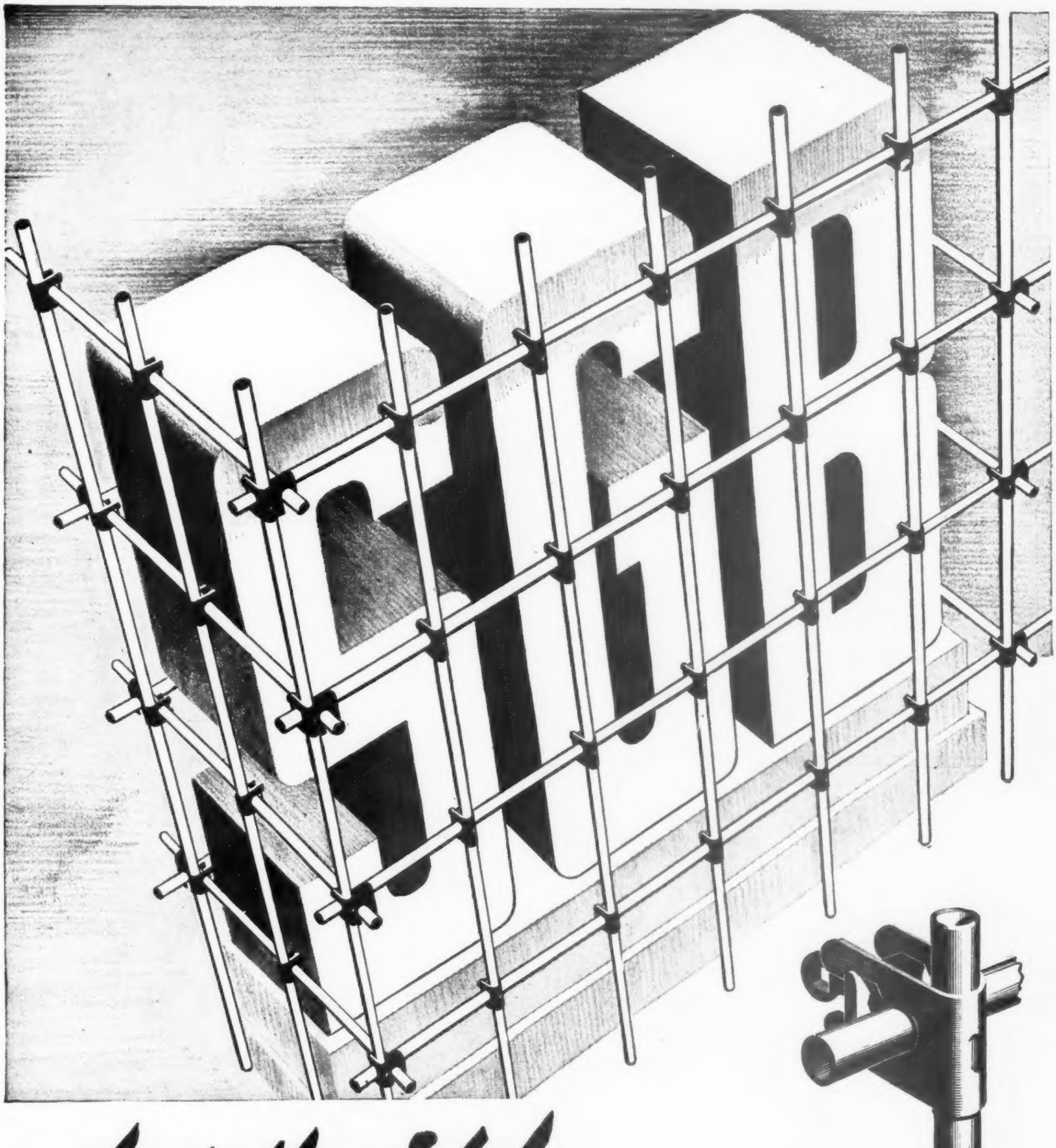
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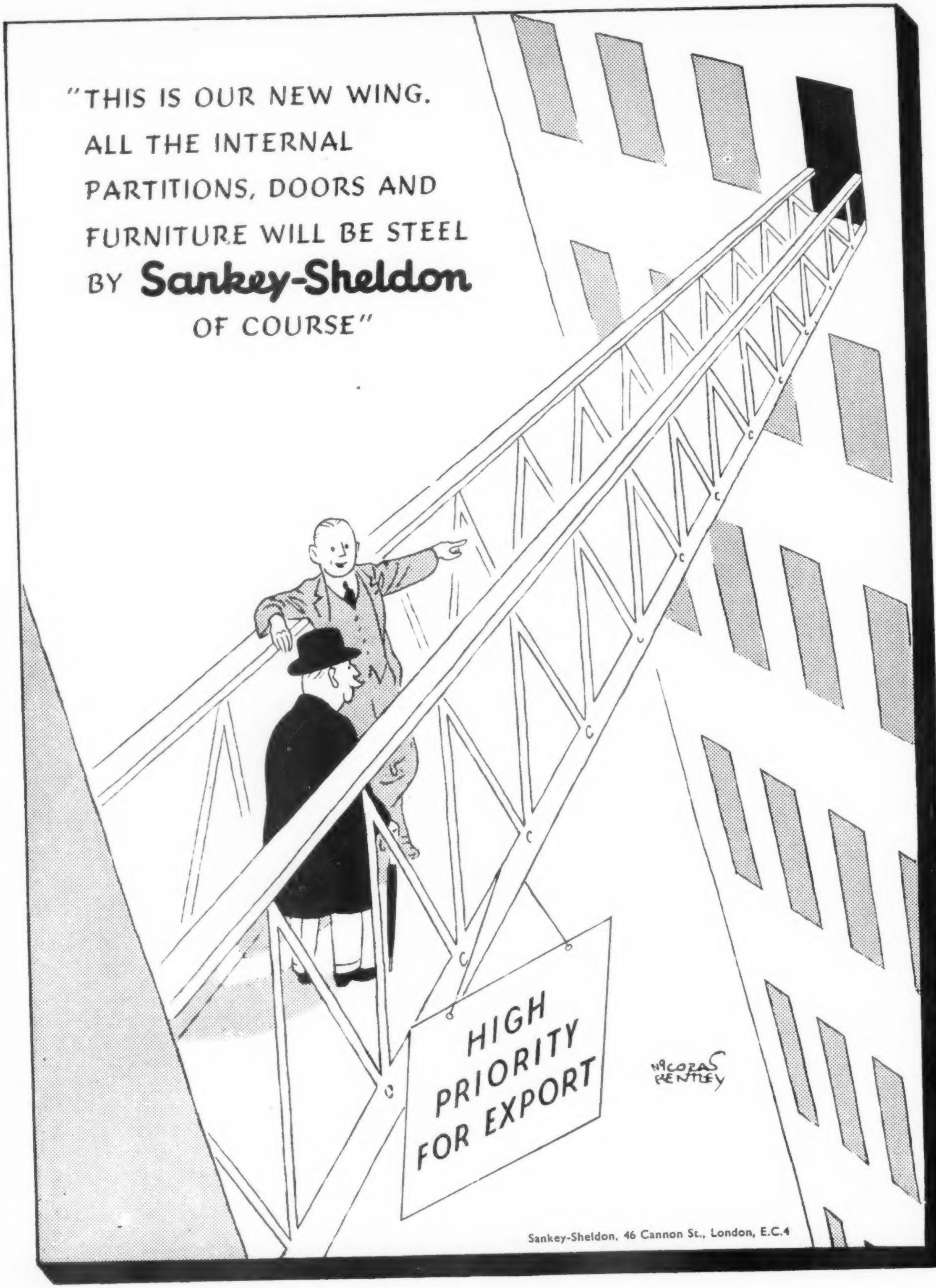
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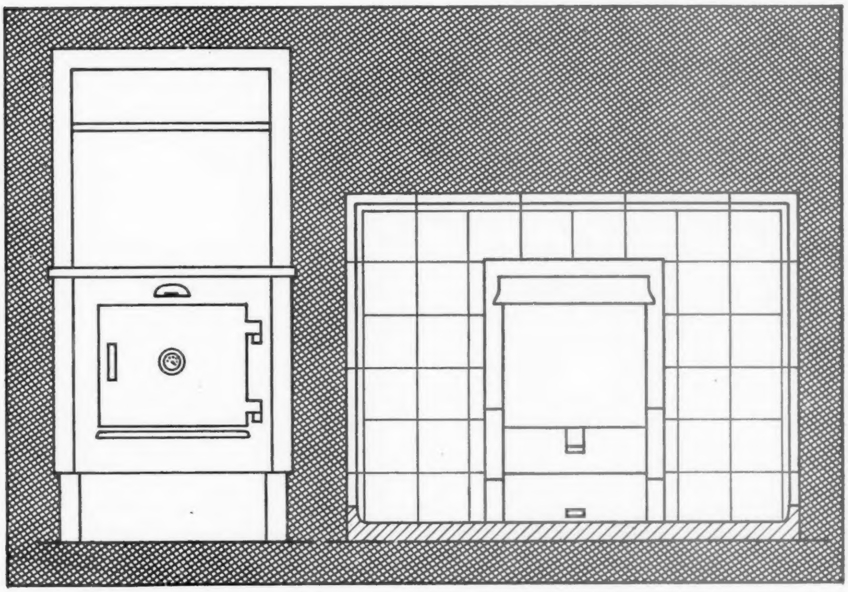

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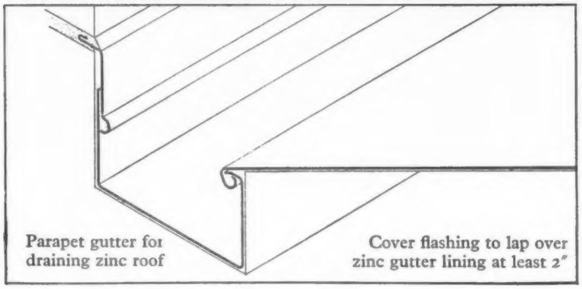
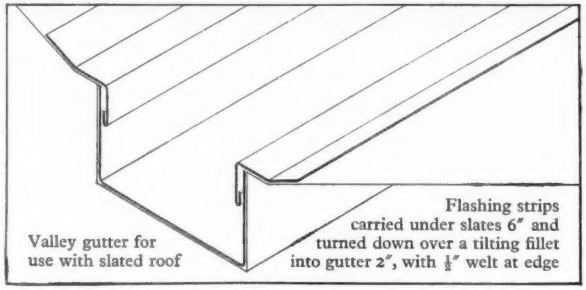
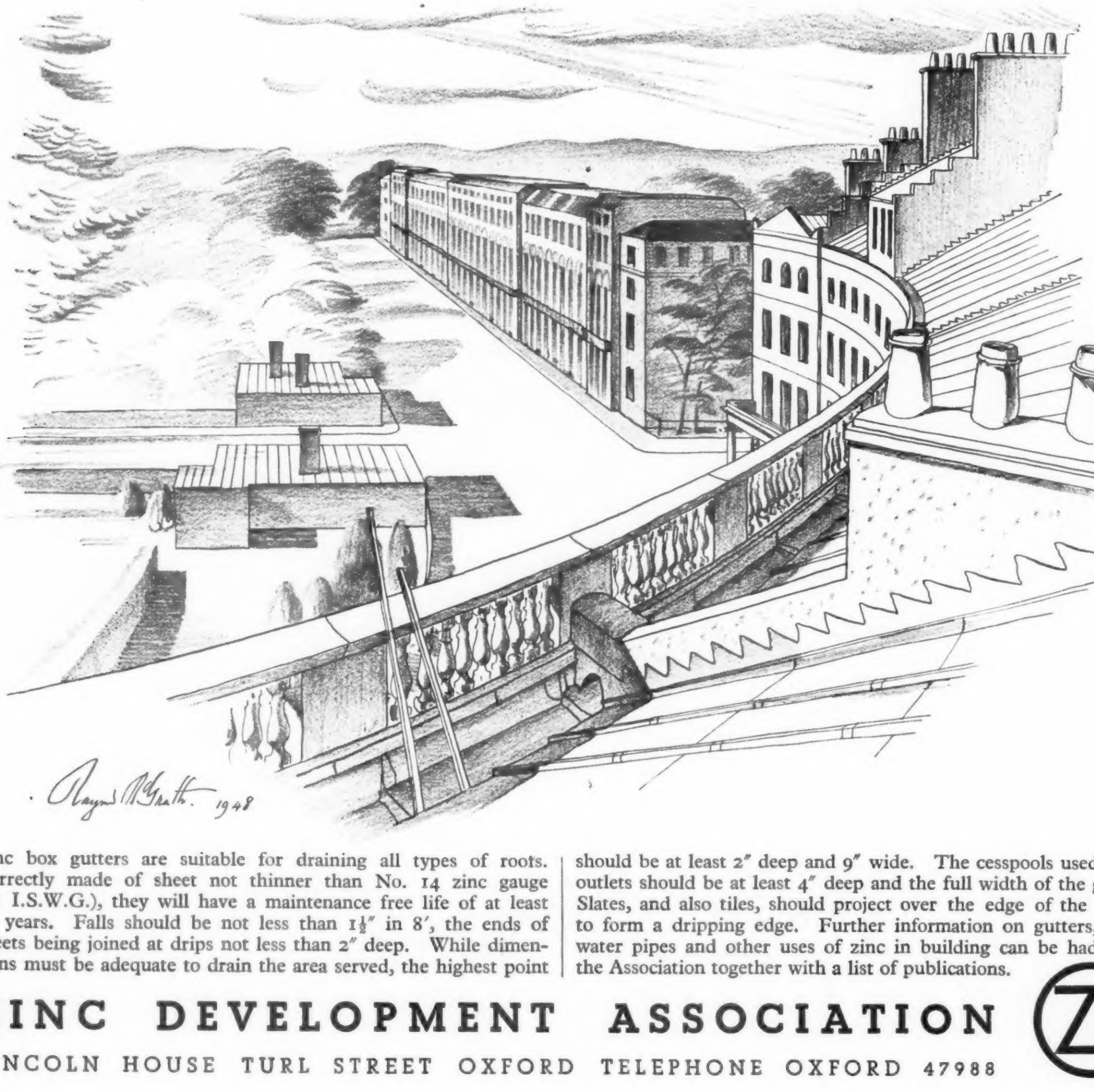
DATA SHEET FOR ARCHITECTS No. 3

ZINC PARAPET & VALLEY GUTTERS







Zinc box gutters are suitable for draining all types of roots. Correctly made of sheet not thinner than No. 14 zinc gauge (21 I.S.W.G.), they will have a maintenance free life of at least 40 years. Falls should be not less than 1½″ in 8′, the ends of sheets being joined at drips not less than 2″ deep. While dimensions must be adequate to drain the area served, the highest point should be at least 2″ deep and 9″ wide. The cesspools used at all outlets should be at least 4″ deep and the full width of the gutter. Slates, and also tiles, should project over the edge of the gutter to form a dripping edge. Further information on gutters, rainwater pipes and other uses of zinc in building can be had from the Association together with a list of publications.

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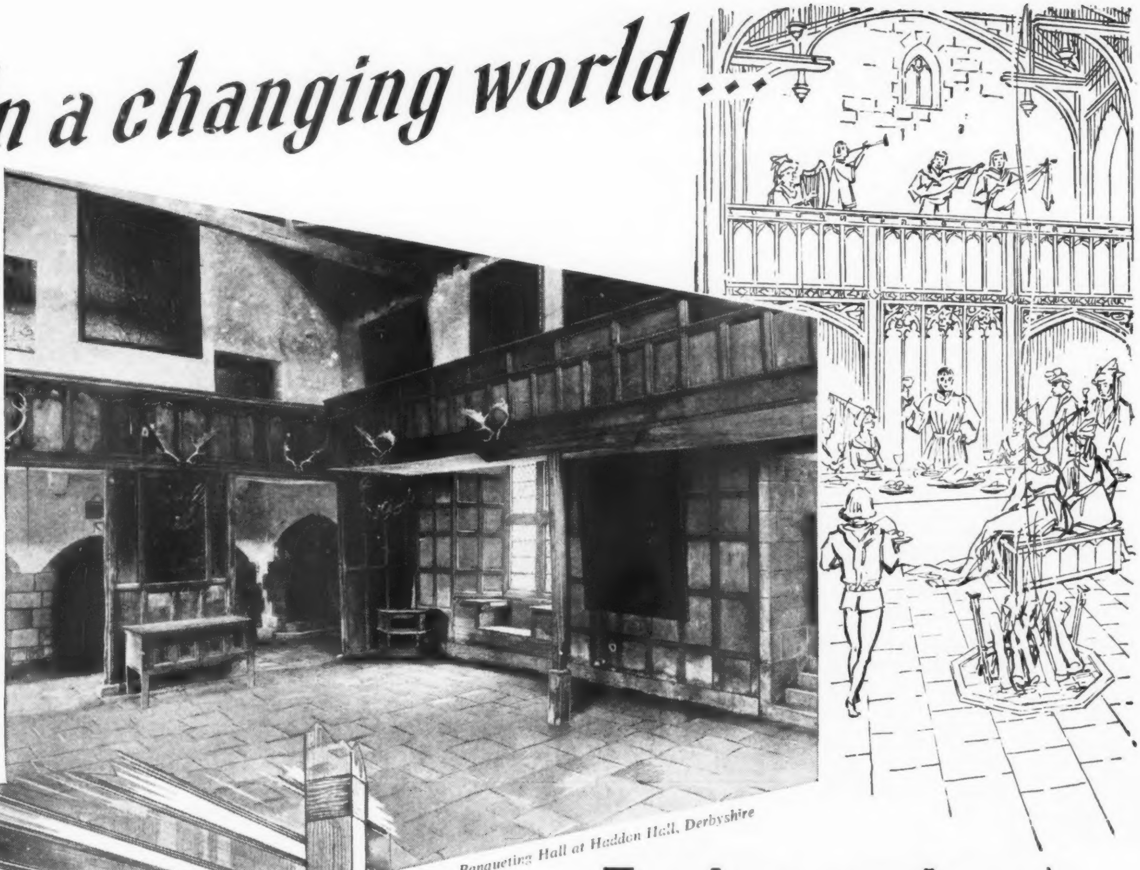
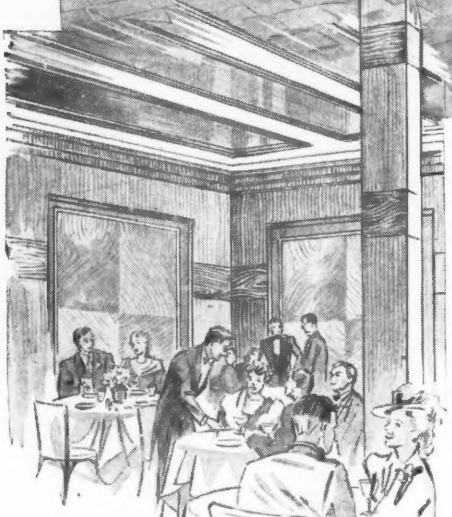
In a changing world ...



Banqueting Hall at Haddon Hall, Derbyshire



Timber endures

The permanent beauty and utility of timber is enshrined in ancient monuments everywhere. Haddon Hall, for instance, with its open timber roof, panelled screen and minstrel gallery excites admiration of 14th century craftsmanship and emphasizes the unique suitability of the material. For similar reasons the modern architect, craftsman and designer prefer timber. They enjoy not only a far greater range of hardwoods and veneers but a wide variety of plywoods—water resistant, flat, shaped or metal faced—prepared for their use with all the advantages of modern kiln drying, fireproofing, etc. to meet the exacting demands of modern tastes and requirements.

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SEMASTIC DECORATIVE TILES IN HOTELS

Photograph by courtesy of Pier Hotel, Brighton

ABLE to withstand wear; possessing a cheerful appearance that will outlast rough usage; simple to clean—these properties any flooring material must have if it is to give good service in use in the hotel.

The architect's problem in these days is to find such a flooring material at an economic price; today, more than ever, high taxes and restrictions have narrowed down that proportion of revenue which can be devoted to the rehabilitation of hotels. Yet never before has the need to resuscitate the charm of inn and hostelry been of greater importance to the nation. £40,000,000 of foreign currency spent by foreign visitors this year—what of 1949? What is the architectural implication—the stone flag and the tile are traditional materials to support the ample bulk of mine host in the Dickensian legend—but today a much greater degree of comfort is *sine qua non*—the illustration shows an hotel bar in Semastic Decorative Tiles; the tradition of the paved floor has been upheld by the use of one of the most modern flooring materials, materials bonded with synthetic resin under great pressure.

Semastic Decorative Tiles have been tested by the Building Research Station: we will gladly furnish any architect with the report. They have been in full production in this country for some time now, and floors laid years ago are still attractive and promise many years of future service. In bars, clubs, public rooms, restaurants, and elsewhere in hotels and inns throughout the country, they are giving good solid cheerful service.

Made in a wide range of colours, plain and marbled, this floor tile lends itself to inclusion in any scheme of decoration—from the sober richness of the foyer of the five-star establishment to the simple bar or dining-room of the small inn.

Bright or sombre, Semastic Decorative Tile gain a quality of surface over the years that is very attractive; they look comfortable and feel comfortable to the tread; they do not provide a "hard floor.'

Accidental damage—the bane of everyone who has to maintain floors in buildings in public use—is so easily dealt with by replacing just so many tiles as may have been affected—but that the Semastic Decorative Tile will stand up to so much and still come up smiling means that repairs are reduced to a minimum. How is this possible? Simply because the materials used in manufacture have been chosen to produce a first-class flooring material; the Semastic Decorative Tile has been built to do the job, and it does it.

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THE JOURNAL OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS

THIRD SERIES VOL 56 NUMBER 1 : NOVEMBER 1948 : 66 PORTLAND PLACE LONDON W1 : TWO SHILLINGS & SIXPENCE

Honorary Members of the Royal Institute

Mr. Douglas William Orr, President of the American Institute of Architects has been elected an Honorary Corresponding Member of the Institute and The Very Rev. Frederick William Dwelly, M.A., D.D., Dean of Liverpool has been elected an Honorary Associate at the Council meeting held on 19 October.

It will be remembered that the election of Dr. Dwelly to Honorary Associateship was mentioned by the immediate Past President, Sir Lancelot Keay when responding to the Archbishop of York's toast at the Liverpool Conference Banquet.

The Working Party

The Building Industry Working Party are inviting evidence from the component bodies of the Building Industry and from persons engaged in it. A questionnaire has been issued which is to serve as a general framework for evidence submitted. The R.I.B.A. Council have appointed a committee to prepare evidence to be submitted by the Institute. The members are T. Cecil Howitt [*F*], Chairman; D. H. McMorran [*F*]; R. H. Matthew [*A*]; Andrew Rankine [*A*]; and Charles Whitby [*F*].

House Heating: the Abbots Langley experiment

Most architects are aware that the Building Research Station have been engaged on a large scale experimental study of house heating methods at Abbots Langley, Herts. We reported last year a visit by members of the R.I.B.A. Council to see the work in progress. The work has now reached a stage at which the first report of results can be made and in this JOURNAL we publish the first official B.R.S. paper on it.

As will be readily understood, the complications in such an experiment are very great indeed. Matters such as the degree of heating (whole house, partial or background plus topping up), the efficiencies of a wide variety of apparatus employing solid fuel, gas and electricity, the methods of applying the heat, the functions for which fuel is used in addition to space heating such as cooking and hot water supply, the domestic labour involved, the installation and running costs of the different types of apparatus and the extent of service they give, the relation of heating to ventilation, the influence of weather, site exposure and thermal insulation of the house, and finally the effects of personal preferences all give immense complexity to an experiment that must have been extremely difficult to devise and laborious to carry through. No one, however, will question its value in one of the biggest fields of building

Michael Theodore Waterhouse, M.C., B.A. (Oxon)
President R.I.B.A. 1948-49.

activity and in these days of high fuel costs; the Director of Building Research and his staff are to be congratulated on tackling it.

The complexity of the experiment is necessarily reflected in the paper, which cannot be lightly skimmed through by those in search of a simple answer. It requires careful and painstaking reading if the full nature of the experiment is to be appreciated and the results absorbed. Those members who are specially interested should note that one of the authors of the paper, Mr. Richard Eve [*A*], is to talk about the experiment and show a film of it at a meeting of the Architectural Science Board on 7 December. Those attending the meeting would be advised to study the published paper first as this will give the necessary background to Mr. Eve's talk, which will be a summary and commentary and not a reading of this paper as now published. We will report the meeting and discussion in the January JOURNAL.

Christmas Holiday Lectures for Boys and Girls

Mr. Peter Shepheard, B.Arch. A.M.T.P.I. [*A*], this year's lecturer, has chosen as his subject, 'How an Architect Designs and Builds'. Much has been said and written about the history of architecture—how it began and how it developed through the ages—but comparatively little about the actual process by which architects design their buildings and get them built. He will explain briefly what gifts an architect must possess and what he must learn, how he lives by his profession and the sort of jobs and clients he has to deal with. Then he will describe the actual making of a design and its translation into a building. He will talk about the best way to look at buildings and how to enjoy architecture.

The talks will be illustrated by lantern slides, and will be followed by questions and discussion. They will be given in the Henry Jarvis Memorial Hall at 3 p.m. on the following dates: Friday 31 December 1948, Monday 3 January and Wednesday 5 January 1949. Tickets for all or any of the lectures may be obtained free on application to the Secretary, R.I.B.A., 66 Portland Place, W.1.

Design at Work

On 26 October the Duchess of Kent opened the first exhibition of work done by the Faculty of Royal Designers for Industry, which is a select panel—not a professional body—comprising some 31 members, and six honorary members from overseas. The faculty includes six members of this Institute. The exhibition was sponsored by the Royal Society of Arts and the Council of Industrial Design, and will remain open to the public until 28 November at Burlington House, Piccadilly. It is intended that the exhibition shall be a forerunner to the 1951 Festival of Britain, just as a similar exhibition held by the Royal Society of Arts, 100 years ago, took its part in leading up to the Great Exhibition of 1851.

In this exhibition at Burlington House four rooms have been converted into 'case-histories' of the designers' work by setting up separate display cases, and hanging canopies to lower the height of the rooms to pleasing proportions. It is not, of course, possible to show the very first operative factor in any design—the thought—but from that point onwards the displays illustrate the various steps which lead to the final approved design and its production for general use. Thus the industrial designer is revealed as an essential member of a team comprising the manufacturer, the production engineer, the sales manager, the technician, the research worker, the retailer, and the consumer. Textiles, electric light fittings, china, glass, school and other furniture, book binding, wallpaper, and lettering are represented, and proclaim what Sir Harry Lindsay, chairman of the Council of the Royal Society of Arts, said at the opening ceremony—that each member of the designing team should be inspired by a single ideal, which is, that only the best will do.

Cardiff. The Need for a City Architect

For some time past the South Wales Institute of Architects have urged the City Council of Cardiff to appoint a City Architect to be in charge of the Council's building work; at present the architectural work is undertaken by a section of the City Engineer's staff. The movement culminated in a deputation to the Public Works and Town Planning Committee, who decided not to advise the Council to make the appointment. The following letter has now been sent by the President, R.I.B.A., to the Town Clerk of Cardiff:

28 *October* 1948

Sir,

The South Wales Institute of Architects have brought to the notice of my Council the fact that a deputation from them was recently received by the Public Works and Town Planning Committee of the Cardiff City Council. The purpose of the deputation was to represent to the Council the need for the appointment of a City Architect. My Council regret to learn that the Committee were unwilling to support the recommendation.

My Council have specially in mind the fact that almost all county boroughs in the United Kingdom have found it necessary, in the interest of the communities which they control, to appoint to their staffs salaried architects in full control of all building work. While many county boroughs have had such architects for a long time, others have recently found that the great pressure of work today resulting from housing, the provision of schools and other community buildings has necessitated such an appointment. I understand that the present value of work for which the City Council has given approval is approximately £4,000,000. My Council are convinced that such an appointment by the City of Cardiff would be in the best interest of its citizens, who are known throughout Great Britain for their civic pride and who, therefore, should be given every opportunity to share with other cities the benefits to which they are entitled. Moreover, they are impressed by the fact that Cardiff is the capital city of a Principality, that it has a long tradition of fine architecture as represented by its magnificent Civic Centre, and that recent town planning legislation makes possible even greater advances in civic architecture.

May I request you to bring the considerations which I have set out to the attention of the City Council and to urge that they give the whole matter very careful reconsideration? Only by so doing can they secure to one of the leading cities of the United Kingdom that concentrated attention to every aspect of architecture that can be given only by an expert, in full charge of his own department and undistracted by the demands of other departmental duties.

Yours very truly,

MICHAEL WATERHOUSE,

President.

The Town Clerk,
City Hall,
Cardiff.

The Late Percy Smith

By the death of Percy John Delf Smith, the Royal Institute has lost its consultant on lettering, whose beautiful craftsmanship is seen at its best in the groups of incised names of Past-Presidents and Royal Gold Medallists on the walls of the entrance hall of No. 66 Portland Place. Percy Smith was renowned for his inscriptional work, which included the Canadian National Memorial at Vimy Ridge and many British Government and private memorials. He was also a calligraphist, etcher, wood-engraver and book designer of distinction. In 1940 he became an R.D.I. and was Master of the Art Workers Guild in 1941. He wrote several books on lettering, which are standard works on the subject.

Industrial Buildings. Exhibition and Conference

As announced in the last JOURNAL, in March 1949 it is proposed to hold an exhibition and conference at the Royal Institute on the part which the architect can play in the design of industrial buildings. The conference will be held while the exhibition is on view, and it is expected that a large number of industrialists will attend. To this end, the Institute has been in touch with the F.B.I. and the T.U.C.

The exhibition will not deal with the architect as an industrial designer but as the planner of industrial buildings. The exhibition will not include those buildings which come under the heading of commerce, i.e. the distributive trades, offices, etc., except where they form an integral part of a factory system and cannot be separated from it. It will include both buildings and equipment, which are designed to promote the welfare of factory workers, and particular attention will be paid to this aspect.

Architects who have material suitable for the exhibition are asked to submit it. In doing so they should note:

1. Although there will be no hard and fast rule the Institute will not normally consider the inclusion of a building unless it has been completed within the last ten years.
2. Schemes and projects must relate to contemporary development and have been prepared for a definite site and client. The Institute may find it impracticable to include 'paper schemes'.
3. Completed work submitted should be illustrated by photographs, and a plan or plans which show clearly the grouping of processes and the production flow. Photographs should also include interior views, where possible with work in progress.
4. Schemes which are under construction or which have been agreed but not yet started should be illustrated by models or perspectives and plans as for (3). As the exhibition is intended for laymen, plans alone will be of no value.
5. Architects will appreciate that material submitted in the first instance will be on a tentative basis, and they need not, therefore, go to the trouble of preparing well-finished drawings, or sketch plans. Once, however, a particular scheme has been selected, then the Institute may have to ask architects submitting material to prepare special plans as was done in the case of the 'New Schools' Exhibition.
6. The Institute cannot guarantee to return material submitted on demand. Architects should, therefore, not submit perspectives or plans which might be wanted urgently.
7. No large mounted drawings should be submitted owing to difficulties of transport and storage, and no drawings in frames of any kind can be accepted.
8. All packages must be clearly labelled Industrial Exhibition, R.I.B.A., 66 Portland Place, W.1. *The closing date is* 22 *December* 1948, but it would be appreciated if material could be received as much in advance of this date as possible.

Danish Art Treasures Exhibition

Of the many exhibitions now open in London, none is so outstanding as that of the Danish Art Treasures on view at the Victoria and Albert Museum until 2 January. The Danes have a superb tradition in art and craftsmanship, which remains in full vigour today as those architects who have seen recent Danish architecture and furniture are well aware. For the first and only time a complete collection of the best things in art and applied arts that Denmark has produced from prehistoric times to the present day is on view outside the country. This is certainly an exhibition which should not be missed.

If the exhibits of the Viking Age and Early Christian era are interesting, those of the Gothic and Renaissance are superb, particularly the wood-carving and tapestries. With the 19th century there came in the porcelain and ceramic products for which Denmark is world famous, followed by the furniture and objects for interior decoration and use which are so well known to architects. These are but a few of the outstanding features in an exhibition of paintings, sculpture, engraving, books, wood carving, textiles, tapestries, jewellery, furniture and porcelain, which arrest the eye and detain the feet of the visitor. One cannot hurry through this exhibition which, incidentally, has been well mounted by Professor Klint, the architect of the exhibition.

Pictures by an Architect

A recent exhibition at the Kensington Gallery of the pictorial work of Gordon Hemm, Dip. Arch. (Lvpl), [*A*], is an interesting example of work in a field into which architects rarely venture, except as a hobby. Mr. Hemm works in water-colour, pencil and ink and his pictures show that feeling for architectural form which one would expect an architect to express, though oddly enough he seems to be equally, if not more, at home with ships. In one picture of the Liverpool water-front his ships in the foreground are drawn with acute observation and understanding while the three great buildings in the background seem a little to lack solidity—but that may be merely Liverpool haze.

It is in his truly magnificent drawings of Liverpool Cathedral that his architectural training is most apparent; he fully appreciates and expresses the bold masses of which the building is composed and the contrasting lace-like detail. He loses nothing of the vigour with which the Cathedral soars upward from its rocky base. Some of his landscapes are pretty rather than emphatic, but in such subjects he cannot avoid comparison with the professional landscape artist who spends a lifetime on little else, but one study of bare trees and a barn is powerful. He seems to have a fondness for drawing old castles, and here he scores over the professional artist; his scenes containing castles are the best of his landscapes because he realizes a castle to be a rocky man-made thing alien to nature—an object which is built and has not grown.

Lithography Exhibition

The Exhibition of 150 years of Lithography open at the Victoria and Albert Museum, should be visited by all who are interested in expression by means of drawing. Invented in 1796 by Aloys Senefelder, a poverty-stricken Bavarian playwright, lithography has attracted many of the most famous artists from Ingres and Goya to those of today. Senefelder, jotting down his mother's laundry list on a piece of Solenhofen paving stone in Munich, stumbled on the principle from which he developed lithography, or printing on stone.

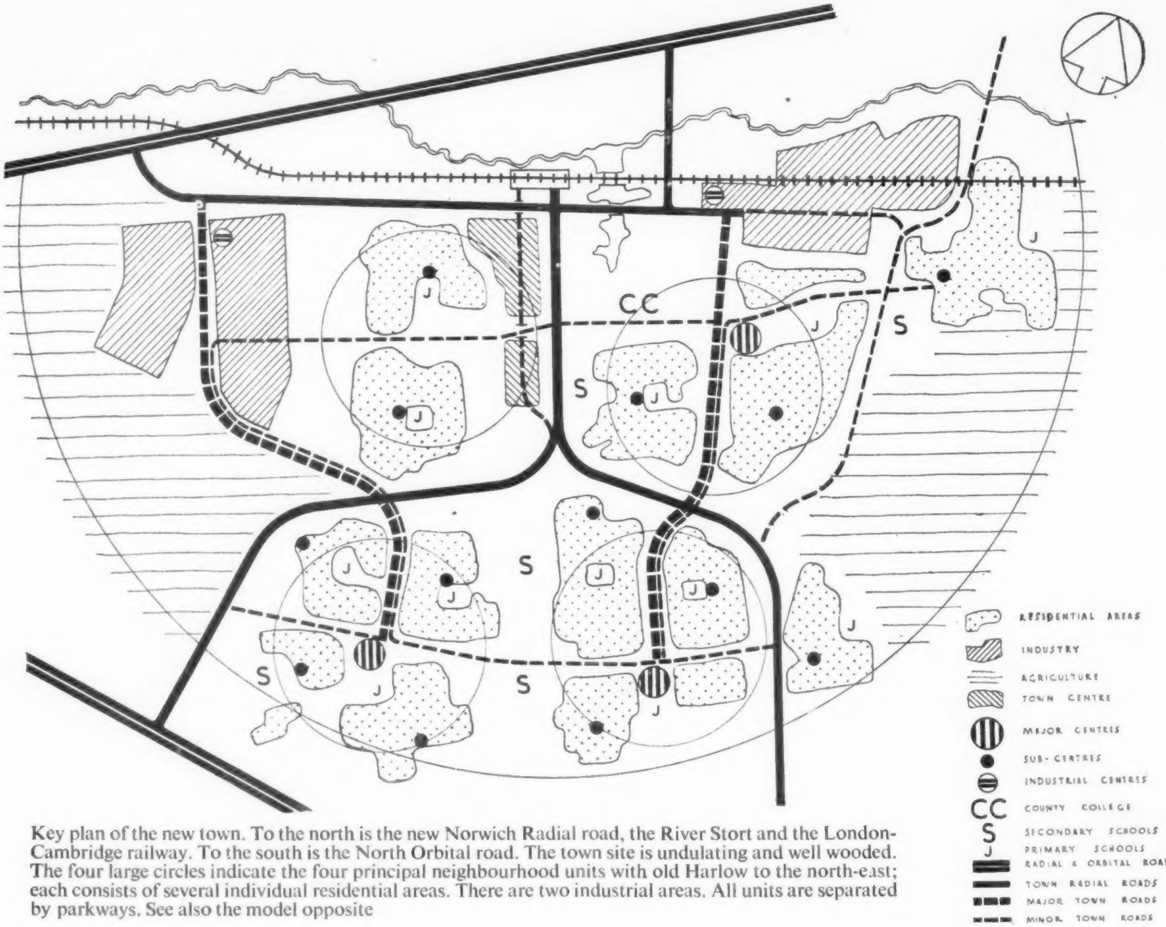
After arousing considerable interest among British artists in the early part of the 19th century, the art fell into disrepute in this country, though the French Impressionists continued to turn out a succession of magnificent coloured lithographs; these artists included Toulouse-Lautrec, Gaugin, Vuillard, Manet, Renoir, Millet, Bonnard and Cézanne. These French prints alone are worth a visit to the Victoria and Albert Museum.

The eye of the architect is at once taken by the prints which illustrate architecture. Outstanding are two views of the Strand and Fleet Street by Thomas Shotter Boys and two drawings of street scenes at Rouen and Evreux by Samuel Prout. These reveal the sharp clarity and wide range of tone values which the process gives. They will be studied with humility by those who fancy water-colour as a medium for architectural perspectives. The qualities of a good lithograph can be assessed from the front cover of this JOURNAL, though the reader should realize that the original loses something from being first photographed and then reproduced by half tone process on paper which is not of outstanding quality.

R.I.B.A. Diary

TUESDAY 7 DECEMBER 6 P.M. A.S.B. Lecture. *Full-Scale Trials on House Heating Systems.* Richard Eve, B.Arch. [*A*].

TUESDAY 14 DECEMBER 6 P.M. Sessional Paper. *The Town and Country Planning Act and the Work of the Central Land Board.* Sir Malcolm Trustram Eve, Bart., M.C., T.D., K.C.



Key plan of the new town. To the north is the new Norwich Radial road, the River Stort and the London-Cambridge railway. To the south is the North Orbital road. The town site is undulating and well wooded. The four large circles indicate the four principal neighbourhood units with old Harlow to the north-east; each consists of several individual residential areas. There are two industrial areas. All units are separated by parkways. See also the model opposite

Harlow New Town: Exhibition at the R.I.B.A.

The New Town in General. Harlow is one of the new towns projected under Sir Patrick Abercrombie's Greater London Regional Plan to relieve congestion of industry and population in London. The site covers 6,320 acres in the heart of rural Essex, 25 miles from London, and incorporates the old village of Harlow. The scheme is for a balanced community of 60,000 persons, some of whom are to be employed by industries removed from London.

The Harlow Development Corporation has been created under the New Towns Act, the chairman being Sir Ernest Gowers, G.B.E., K.C.B. The Corporation is charged with the duty of planning, constructing and establishing the town, and when this has been achieved the staff and organization will be transferred to an elected and properly constituted municipality. It will take 15 to 20 years to build the town.

The Master Plan has been made by Mr. Frederick Gibberd [*F*]. Although the plan has not yet passed through the final stages of official approval by the Minister of Town and Country Planning, a great deal of preliminary study and negotiation has been done, the main lines of the plan and the stages of development are agreed and actual site work is starting.

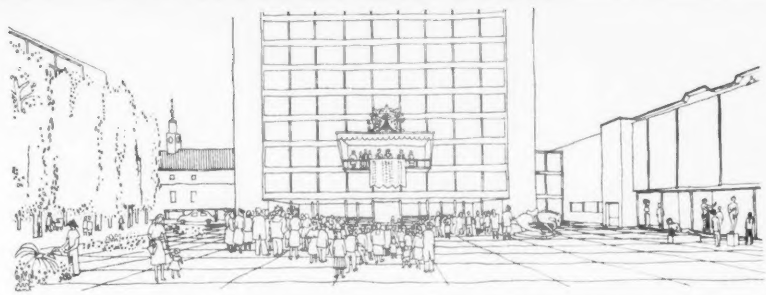
The principal executive officers of the corporation are: General Manager, Mr. Eric Adams, O.B.E.; Architect, Noel Tweddell [*A*]; Engineer, O. W. Gilmour, M.A., B.A.I., M.I.C.E.; Estate Officer, R. D. Relf, F.R.I.C.S.; Finance Officer, B. Hyde Harvey, F.I.M.T.A., F.S.A.A., D.P.A.; Social Development Officer, Marjorie E. Green, M.A.; Solicitor, J. Jacques.

Mr. Gibberd is retained as consultant to watch over and advise on the successive stages of development. His Master Plan has laid down the locations and approximate shapes of the various units of the town; certain of these, such as the civic centre, shopping centre and sports area, are necessarily designed in rather more detail than are others, such as the housing areas. As each area comes to be developed, the procedure is for the Corporation's officers to provide detailed designs on which Mr. Gibberd's views are sought.

The Exhibition. The central feature of the exhibition was the magnificent model of the whole town as planned by Mr. Gibberd. This reproduces faithfully the landscape features such as changes of level, woods, tree groups and streams, the road, rail and canalized river and, in solid form the more fully planned areas of building. The housing areas are shown by a light colouring on the fields. Grouped on screens round the model were the principal drawings of the Master Plan, and on a side table was the model of the Civic Centre.

One side of the hall was taken up by exhibits illustrating the work of the Engineer's department. There was a cross-sectional model of the town site showing the geological substructure; the making of the grid survey was explained by plans and photographs; there were plans and sections of roads and a model of a length of dual

Above: the model of the town. The town centre, shopping centre and sports centre are shown built up, the residential areas are shown in light colour. Right: sketch of the town square showing the municipal offices



roadway; proposals for sewerage and sewage disposal were shown.

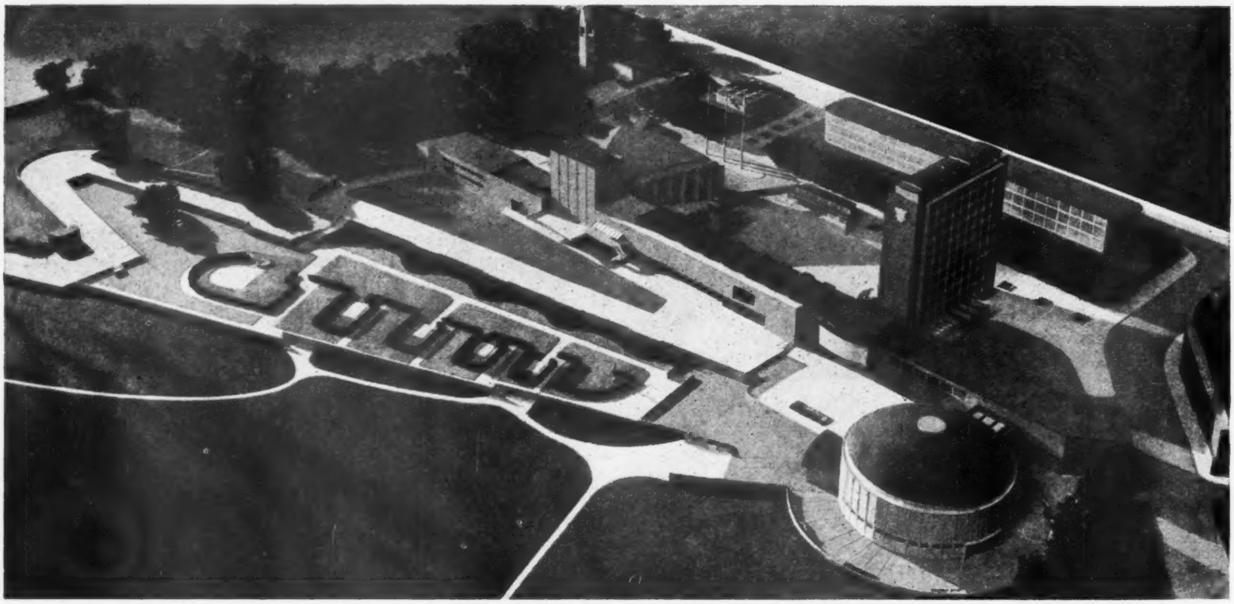
The work of the Architect's department was shown along the other side of the hall and at the back. This began with preliminary layout proposals for the Mark Hall site, the first neighbourhood unit; the details of this are not yet finally settled. There followed a series of plans, elevations and perspectives of house types (see pages 8, 9 and 10). Four types were shown: (*a*) terrace 3-bedroom living-kitchen, (*b*) terrace 3-bedroom working kitchen, (*c*) terrace 2-bedroom, and (*d*) 3-bedroom semi-detached. A model of the Post Office site of 98 houses, the first to be built and now out to tender, showed the use of these house types (see page 7). A model and plans of the layout of the East Industrial Area, on which work is to start shortly, concluded the exhibition.

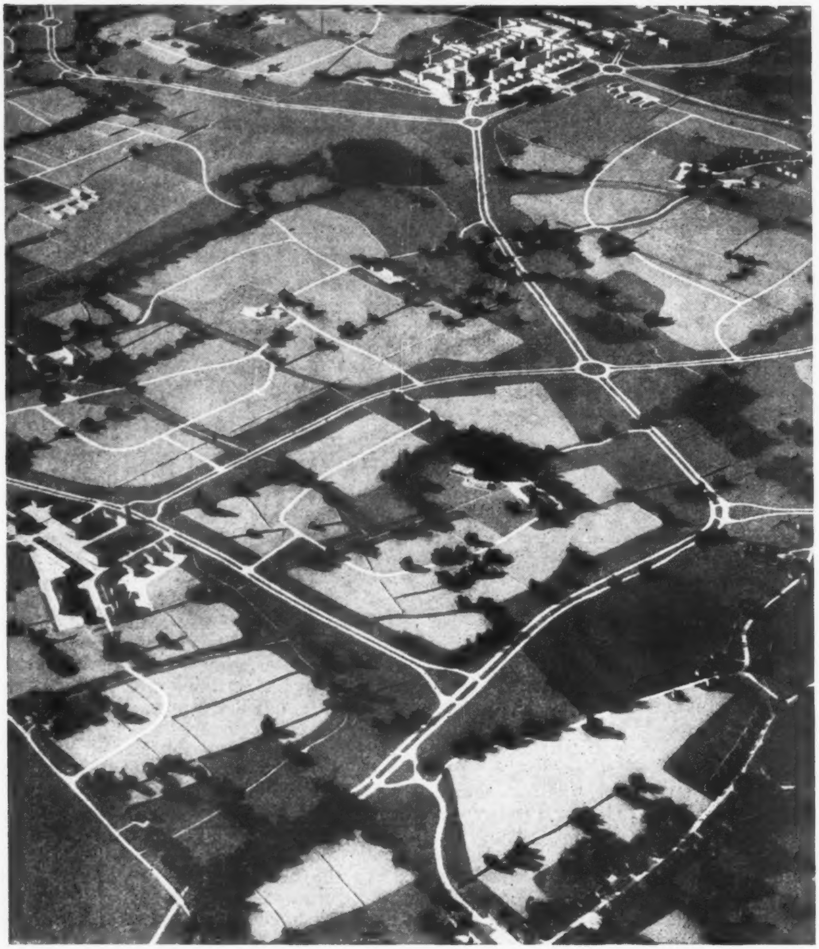
The Opening Ceremony. The exhibition was opened on Friday 22 October by Mr. E. M. King, M.P., Parliamentary Secretary to the Minister of Town and Country Planning. The Minister, Mr. Silkin, was to have performed the ceremony, but was still on his honeymoon. Mr. Frederick Gibberd [*F*], A.M.T.P.I., and the President, R.I.B.A. were also unable to attend, the former through illness. Mr. A. W. Kenyon, C.B.E. [*F*], Vice-President, R.I.B.A., deputised for Mr. Waterhouse.

Sir Ernest Gowers, M.A., G.B.E., K.C.B., Chairman, Harlow Development Corporation, said it was the first occasion on which a comprehensive exhibition of models and drawings of Harlow had been open to the public. Major-General Pakenham Walsh, C.B., M.C., Deputy Chairman, Harlow Development Corporation, inviting Mr. King formally to open the Exhibition, said it was unfortunate that Mr. Gibberd was unable to be present at the opening of 'this exciting venture', and he felt all present would wish him a speedy recovery.

Mr. King congratulated Sir Ernest Gowers, Mr. Gibberd and the officers of the Corporation on the work that had been put in to make the exhibition tell its story to an ever-growing architecturally conscious public.

In the last ten years we had moved through the shadows of war and economic strife. Throughout this period all had consciously felt that a time must be at hand





Above: model of the town centre. The circular building is the civic hall, beyond are the multi-storey municipal offices with the town square and theatre on the left. Left: detail view of the large model showing the residential areas marked in light colours; the town centre is in the distance. The parkway system between the residential areas is clearly seen

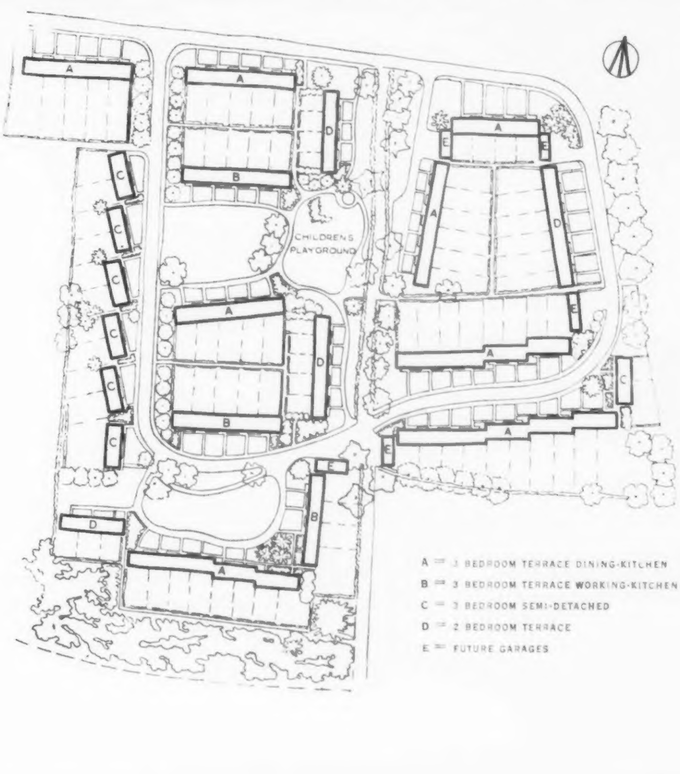
when it was desirable to concentrate upon British institutions and not upon those things which debarred them. Now the time was at hand to give form and substance to ideas which had been formulated in darker days. Now was the time to see that parks and open spaces as things of beauty and tools of leisure were given their rightful place in our national life. The New Town of Harlow placed these things as a foremost necessity and represented an opportunity to bring them about.

Mr. King thought an unusual precedent had been created by showing to the present residents of the area what would be the ultimate result of this radical change. They were not going to have their homes, their village, their farms uprooted or even submerged; they were one and all about to have them enhanced. People would migrate there, people mostly with one aim in view—if the architects and Corporation had their way—and that was to put people together with the *opportunity* to be happy.

Harlow was only one, but a very important one, of the yardsticks by which posterity would judge our planning. For his own department, Mr. King said that the Harlow Plan was being studied with the closest and keenest scrutiny. He hoped the exhibition which he had pleasure in opening might be an inspiration to all.

Mr. Arthur Kenyon, Vice-President, R.I.B.A., proposed a vote of thanks.

How a Town is Built. A question which must arise in the minds of most architects is how

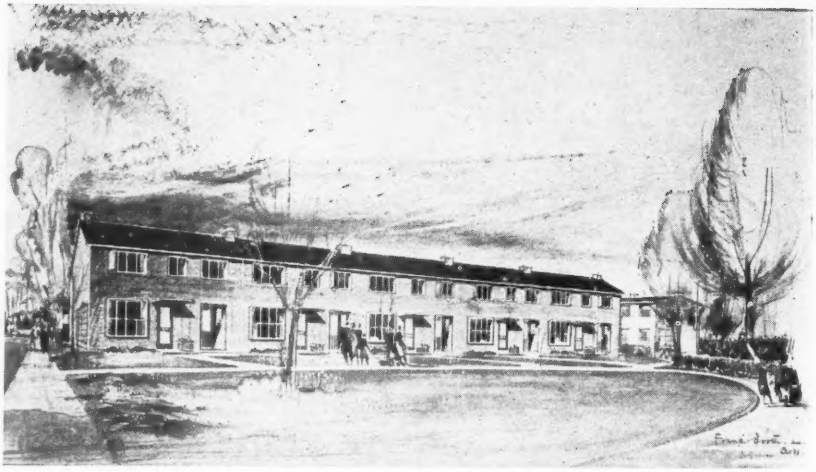


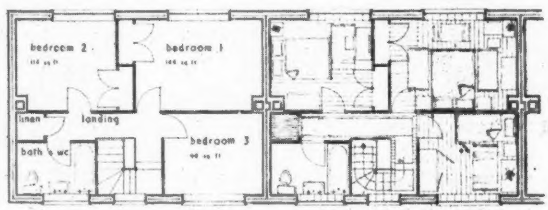
Top: two sketches of views in the town centre. Middle: model of the Post Office site scheme. Below: plan of the Post Office site scheme showing the house types

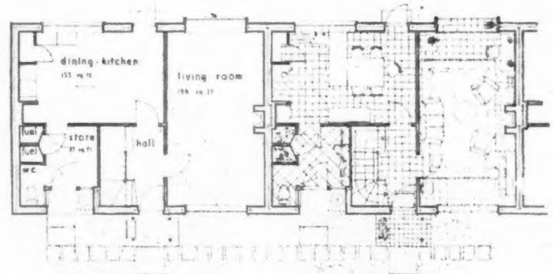
a body like the Harlow New Town Corporation, having a town site and master plan and a central organization created, sets about its task. Newcomers to the town must have both houses and work to do simultaneously; their wives need shops, the children schools; there must be some arrangement for amusement and recreation. New buildings need water supply and sewers, and all such public services must be provided from the first as fully operative parts of an ultimately economical and efficient whole. To obtain some idea of how this is to be done we asked Miss Marjorie Green, the Social Development Officer, to tell us. The following is written from some notes provided by her.

Beginning with the essentials of sewerage and water supply, a first fact is that the existing sewage works of old Harlow can deal only with about 150 more houses. The works are therefore to be extended to meet the first two or three years of building. Beyond that the solution will be found in the construction of the long-contemplated regional sewerage scheme for the Lea Valley. This cannot be completed for some years, but Harlow and Stevenage Cor-

Three-bedroom dining-kitchen terrace house. Perspective, plans and garden elevation







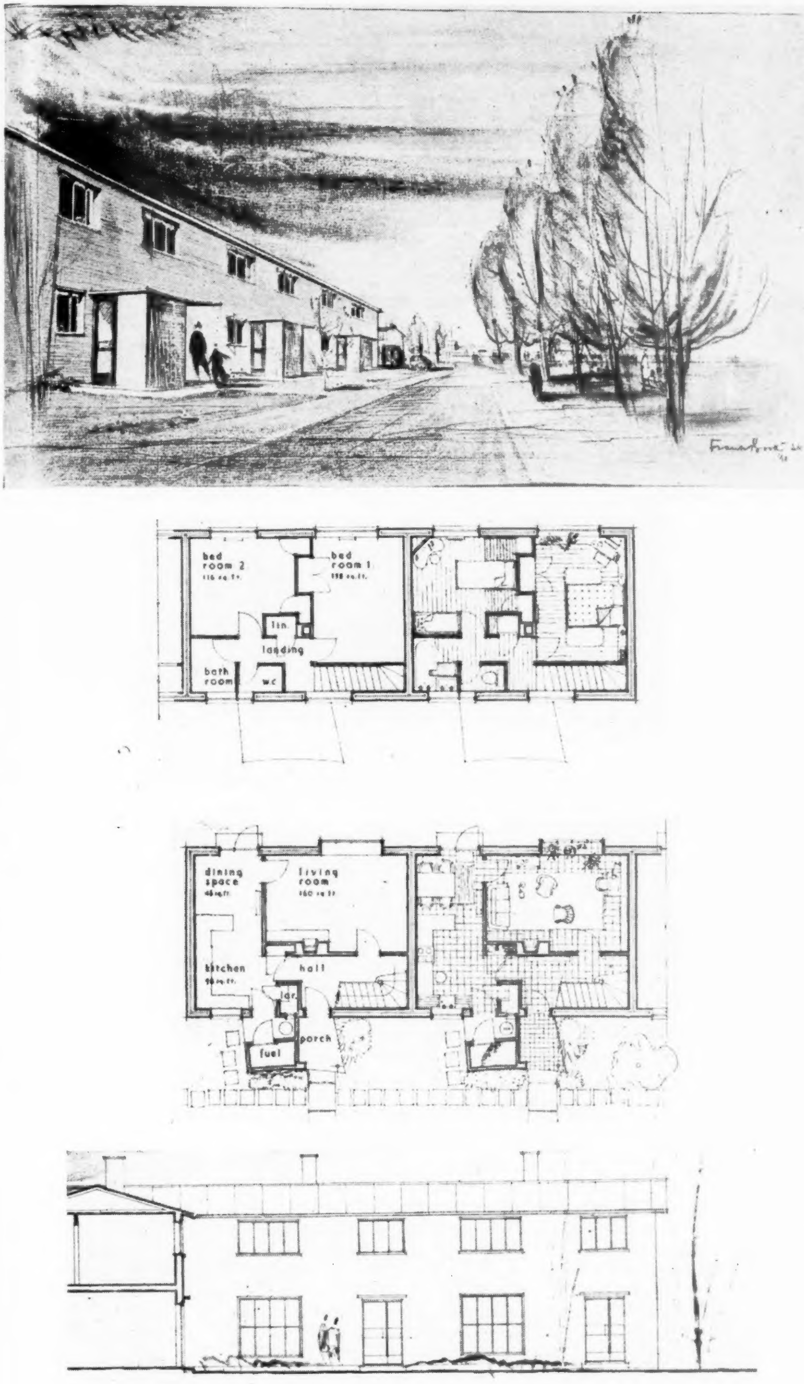
porations have obtained permission to go ahead with that part of the work essential to their development. The Harlow Corporation has also applied for powers as a water undertaking; present supplies within the area would cover the first 10,000 of population. Sites for the sinking of new wells in the chalk formation outside the area are being considered, and geophysical surveys followed by trial borings are about to be made. Telephones, bus routes, railway sidings, gas and electricity supplies are being planned in consultation with the authorities responsible.

So far as house building is concerned, an immediate need is for houses for key building workers and for the Corporation's staff. Apart from the scheme for 98 houses now out to tender, the construction of a labour camp will begin next year, though even when this is completed many of the building workers will have to be transported daily. The first housing area to be developed is adjacent to Old Harlow, which will form the first neighbourhood unit, the present population being expanded from 2,500 to 4,500.

The rate of progress obviously depends upon the general economic situation and the extent to which New Towns can draw upon labour and materials. Assuming, however, that the town will be built in 20 years, it is contemplated that the rate of building will accelerate up to a peak about the year 1960. After that the labour force will gradually decline to the normal level for building and maintenance for a completed town of 60,000 people. The timing of the programme is all-important. Not only must the building of houses be timed to fit in with the construction of roads and the provision of services and amenities, but with the building of factories and other work places. Development of the East industrial area and of the first residential area will therefore proceed together, any houses completed some time before any factory is ready being used for building workers.

As soon as the architects get down to the detailed planning of residential areas and industry they pose questions to which the answers at this stage can be, at best, only intelligent guesses. What should be the ratio of houses to flats? What proportion of hostels and flatlets should be provided for single workers? How many old people's dwellings? How many houses will be needed with two, three, five bedrooms? What proportion should be of the non-subsidy type? To what density should the industrial estate be planned? Given this, what proportion of the population will be engaged in manufacturing industry? In fact what sort of town will this be, and what sort of people—young or old, rich or poor—are going to live in it? The answer depends partly upon the way in which industry and population are to be recruited.

From the enquiries made to the Corporation there is no lack of industries eager to move to a new town. But the industries whose applications may be considered are limited in accordance with the Government's general policy on distribution of industry. The express purpose of the New Towns in the London area is to provide for decentralization of industry and population from Greater London; therefore to qualify for consideration for a site in Harlow a firm must already be operating in the Greater London area; new undertakings will not be considered, nor will businesses which could conveniently move to a Development Area. In addition, under present conditions, only firms of import-



Two-bedroom terrace house. Perspective, plans and garden elevation

ance to the export drive are likely to obtain the necessary building licence.

Industries will bring with them a proportion of their workers. They will want especially to bring their key men. The rest of their labour will be recruited from families willing to move to a new town and living in one of the congested boroughs of N.E. London. Harlow has been provisionally linked with a number of these boroughs—among them Tottenham, Edmonton, Leyton and Walthamstow. All these authorities have plans for redevelopment in accordance with the Greater London Plan. But little progress can be made until some of their population can be drawn off.

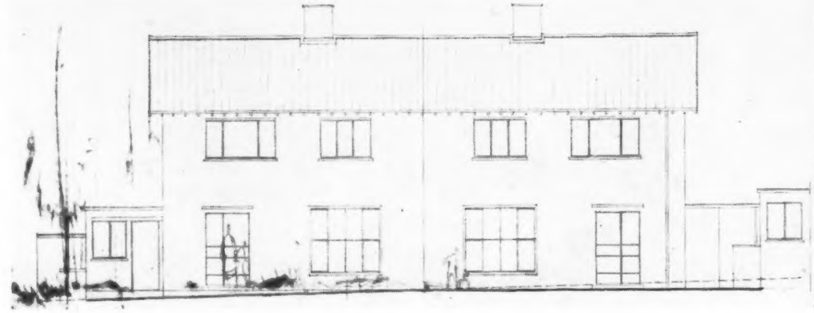
It is obvious that the selection of population and of industry is interdependent. The sort of people who will live in the town depends a great deal on the types of employment offered. At the same time the Corporation, in selecting industry, must take into account the employment needs of the town's residents. For example, if a large firm employing only adult male labour were to be one of the first industries, the Corporation would want to balance this by industries giving opportunities for juveniles and employing a proportion of women workers. The aim is to provide employment which would give scope for a wide variety of abilities and preferences. In considering applications from firms the Corporation want to know, therefore, the proportion of men and women, adult and juvenile labour they employ, how much of the work is skilled or unskilled, how far it is seasonal, the factory space required, the demands which will be made for services such as gas and water, what effluent will have to be dealt with, what road, rail or canal transport will be needed.

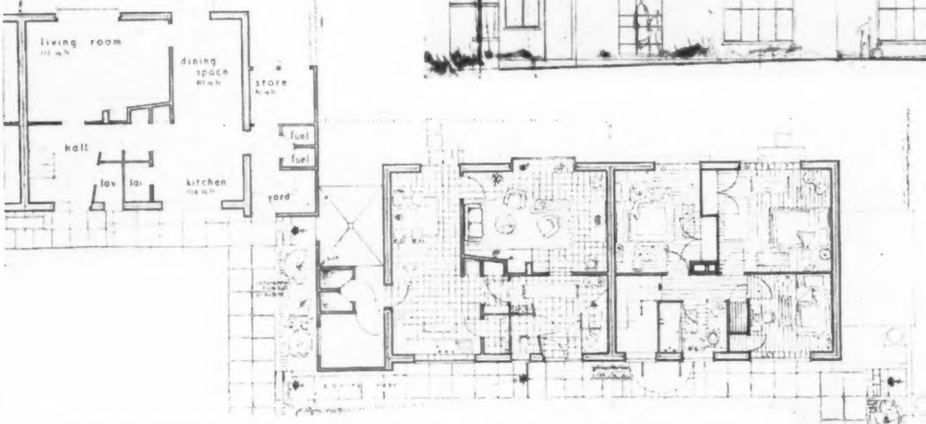
But before the layouts of the industrial areas are planned there is a more fundamental question to be considered. In a town of 60,000 how many workers will be employed in these areas? This depends on many factors, on the proportion of the population who are of working age, on the opportunities for female employment, and above all on the extent to which non-industrial employment is available in the new town—in services, in commercial enterprises, in the professions. This will largely determine the character of the town.

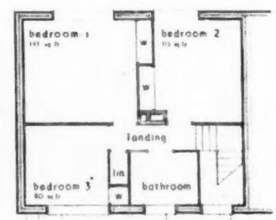
The Corporation are tentatively working on the assumption that the industrial population will number somewhere about 12,000, rather less than half the estimated working population. Of the remainder some will form the core of permanent building and civil engineering workers, but the rest must be employed in commercial undertakings, in the services and professions. The Corporation are encouraging non-industrial employers, such as branches of government departments, research and educational institutions to settle in the town. Opportunities for the black-coated worker will also grow as Harlow becomes a service centre for the surrounding countryside—in education, in entertainment, in shopping.

In trying to achieve a balanced population the Corporation must look to the ages as well as to the occupations of the immigrants. The experience of housing estates before the war, with their predominance of 3-bedroomed houses, has shown the disadvantages of attracting an unduly high proportion of families with young children. An initial 'bulge' in the number of young children under 15 followed in the next 10 years by a depression in this age group,

The semi-detached house. Plans and garden elevation. The houses are shown staggered as in the site plan on page 7







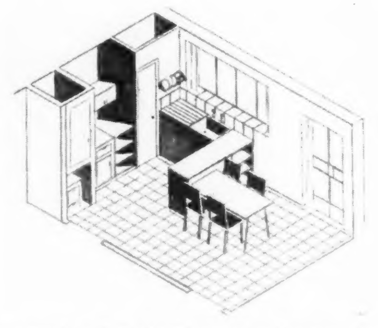
Members of the staff of the Chief Architect, Mr. Noel Tweddell [*A*], responsible for the Post Office Scheme illustrated on pages 7 to 10, are: Architects, T. A. L. Belton, M.B.E., B.A. [*A*], F. Booth, A.M.T.P.I. [*A*]. Chief Assistant Architect, R. Sheridan-Shedden [*A*]. Assistant Architects, G. W. Dale [*A*], A. McCowan, Dipl. Arch., C. Featherstone, Dipl. Arch., D. L. Dyer, Dipl. Arch.

makes rational planning of maternity and child welfare services of schools and of house sizes an impossible task. It is likely that the new town population will on the whole be younger than that of England and Wales as a whole, but the Corporation will in its selection of industry and population aim at avoiding an age structure which would result in violent fluctuations in the numbers in each age group.

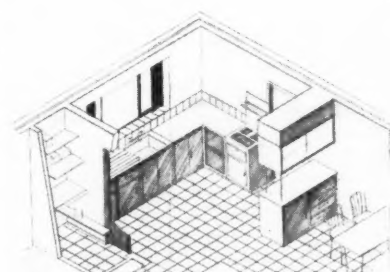
The first step in physical development is the acquisition of land. With this end in view a great deal of the land and property within the designated area has been 'referenced' during the last six months by the Estates Department. For the Corporation to have full control of development within the new town and to reap the benefit of increases in value resulting from its own operations, it must eventually own the freehold of all the land within its area. But this is long-term policy. Under present economic conditions the financial policy of the Government precludes the purchase of more land than is required for development within the next two or three years. The Corporation have recently been authorized to purchase approximately 1,000 acres for the first stage in development. About half this area is required for houses and factories, roads and engineering works. The rest is being acquired in order to avoid severance of agricultural holdings.

Where the land actually required for development would cut through a farm unit, it is the policy of the Corporation to include the complete holding in its acquisition. The Corporation as landlord will thus be in a better position to co-operate with farmers in planning their cropping ahead of development, and to adjust farm boundaries so as to reduce as far as possible the inconvenience to occupiers and loss to food production. For instance, if only part of a farm is required for development, the remainder, if it could not be worked as an economic unit, might be added to an adjoining holding which in turn was losing some of its land for building.

Hitherto the planning of towns based on neighbourhoods has been done only on paper. There is little experience to guide the planning of a residential area which will have an identity and a life of its own and yet be an integral part of the town as a whole. Old towns have generally grown outwards from a centre. In the new towns the periphery may be built up before the centre can be completed. But the neighbourhood must nevertheless be planned so that when the centre is built it will serve as a focus for the whole town. In the first three or four years the neighbourhood centre may therefore have less shops or a less magnificent cinema than its population would warrant. The Mark Hall neighbourhood (No. 2) is planned for a population of 6,500 but it contains the major neighbourhood centre which will also serve 5,700 people in Neighbourhood No. 3 when built. The main shops, community centre, sports ground and cinema are also here.



Isometric of dining-kitchen in the three-bedroom terrace house



Isometric of dining-kitchen in the semi-detached house

Report of the Ministry of Education's Technical Working Party on School Construction

IN NOVEMBER 1946 the late Miss Ellen Wilkinson set up a Working Party under the chairmanship of Sir William Cleary, the other members being D. Clarke Hall [*F*], H. Conolly [*F*], B. Dangerfield [*A*], F. Jackman [*F*], J. C. Knight, A.M.I.H.V.E., W. Leadbetter, A.M.I.Mech.E., A. A. Part, R. Sheppard [*F*], C. G. Stillman [*F*], with L. R. Fletcher of the Ministry as Secretary.

The terms of reference were: 'To consider and make recommendations on the technical details of the principles of school construction suggested in the 1943 Report on Standard Construction for Schools in the light of the present materials position and of the long-term building programmes required by the Education Act, 1944.'

The 1943 Committee was held under the chairmanship of Sir Robert Wood, and their work is embodied in Post-war Building Study No. 2, 'Standard Construction for Schools'.

The 1943 Wood Committee saw that their problem admitted of more than one solution, according to the desired degree of standardized construction, and for study and investigation they selected two approaches, (i) one that conceives of the school as a connected structural whole, to which any dimensional factor adopted can be applied throughout, thus leading to the plan scheme, and (ii) one which considers the school as a group of separate plan units which may be left unconnected, or connected by *in-situ* work, as desired.

When beginning to consider the two Wood approaches, the Working Party were conscious that in the intervening five years a number of important developments had occurred which directly affected educational building, and the shortage of materials suggested to the Working Party the need for some shift of emphasis in the approach to standardization. Further, the Education Act, 1944, the Building Regulations made under that Act, and the announcement of definite educational building programmes, gave the Working Party a clearer indication of the amount and kind of educational building to be done during the next 10 or 20 years and of the standards to which the buildings would be expected to conform. But developments in the building and in the materials industries have made the performance of the task increasingly harder. The Report of the Working Party, therefore, considers these considerations in detail, and the findings are briefly summarized below.

The Education Building Programme contemplated an expenditure of £1,000 million spread over some 15 years; the White Paper on Capital Investment in 1948 (Cmd. 7269) indicates an estimated expenditure of £20¼ million in 1947 and £32 million in 1948, and these estimates are based on actual projects, and although they must be tentative, because of economic conditions, they help in standardization and prefabrication, and authorities are enabled to group projects together from the point of view of development work, planning and bulk ordering. Shortages have not been confined to any one material at any one time, so reliable forecasts of availability could not be made, and probably the situation is not likely to improve sufficiently during the next few years to allow a free hand in the choice of materials; indeed, last minute changes to alternative materials may sometimes have to be made, and so the Report considers it unwise to tie the entire school building programme to a system of construction that relies on the regular and substantial supply of one particular material, or to be too precise in recommending technical details.

As educational building projects are subject to a time-limit, and as the supply of building labour varies in different localities and is in competition with other big programmes of equal urgency, considerable use of prefabrication may be inevitable and the need for it may persist even when normal conditions return, because the long-term programme may be too large to be carried out by traditional methods of construction in a reasonable period of time. Initial work on schemes of standardization will save work later on, not only in the offices of the Ministry and local education authorities, but in the factories in the shape of substantial economy in shop drawings. Building costs have risen since the war, and if they rise higher the programme of several hundred million pounds in the next 15 or 20 years will be impaired, and the Report states that economy seems to lie in the direction of (*a*) a review of the Building Regulations made under the Education Act, 1944, (*b*) any contribution which standardization, bulk ordering and prefabrication may be able to make towards reducing costs, and (*c*) economical planning by the designer. The Report expresses the hope that the number of sizes of rooms prescribed in the Regulations will be reduced so as to avoid small differences in area such as those between 520 and 540 sq. ft. and 700 and 720 sq. ft., to assist economical standardization. Economical planning is very important, and the cube content should be cut down by strict adherence to the areas prescribed in the Regulations and by the economical disposition of the accommodation.

In the section on Standardization and Prefabrication the Report says that the materials position alone makes it unwise to select any one particular system of construction as the best general solution, nor is the production of something like a 'national school' favoured. The shell of the building (structural framework, walling, roofing, windows and doors) is best suited to bulk ordering and mass production. But for a manufacturer to make his plans well ahead he must be assured of a demand steady enough to let him undertake long production runs, which calls for *either* a national standard *or* a standard to be used by a sufficient number of customers to ensure steady and substantial orders, *or* a really large order from one or two local authorities.

The first 'approach' of the 1943 Wood Committee was based on a fixed two-directional dimension of 8 ft. 3 in., forming a grid of squares, pre-supposing a general and connected framework to which the whole of the structure must conform, but one objection to this is that it is not readily suited to irregularities of site and major changes of level. The Report does not consider this to be an over-riding argument against the proposal. The main difficulty lies in the choice of the grid dimension. The 8 ft. 3 in. dimension was selected in relation to the length of a classroom of 24 ft. in the clear, though it might result in an excess of 2 ft. to 3 ft. in the width of such a classroom, and thus a financially uneconomical amount of accommodation would be provided, especially in secondary schools where classrooms of 480 sq. ft. are required. The Working Party, therefore, sought a more convenient dimension; one that—apart from other considerations—would not only suit educational building, but should also be appropriate for other types of buildings so that structural and other components of common dimensions may be used over a wide field, and these considerations point to a dimension of 3 ft. 4 in., which is not necessarily the final solution but is likely to prove more flexible and economical than the 8 ft. 3 in. dimension.

The second 'approach' envisages each plan unit (i.e. each room or group of rooms) as being complete in itself and capable of being placed in position in any plan scheme independently of any adjoining plan units or structure. The majority of the members of the Working Party thought that this second approach will generally be preferred as simpler and more economical, but the Report is not able to recommend any particular system as the ideal solution.

It is recommended that a Standing Technical Committee be constituted to assist the Ministry regarding the performance of the numerous experiments in design and materials now being made.

The section on Architectural Amenity considers the æsthetic effect of standardization, and says that schools must have grace and individuality and arouse loyalty and appreciation in the child. The various regulations and the recommended use of standardized spacings pre-determine the length, breadth and height of school buildings, and unless considerable ingenuity is exercised in their design the regular repetition of post and lintel in standard dimensions will be monotonous in a single school and uniform over the country. More attention should be paid to the development of surface textures and colours in factory-produced materials.

The Report is published by H.M.S.O., price 1*s*. net.

The Economics of House Heating

By Richard Eve, B.Arch. [*A*] and J. C. Weston, Ph.D., A.Inst.P.

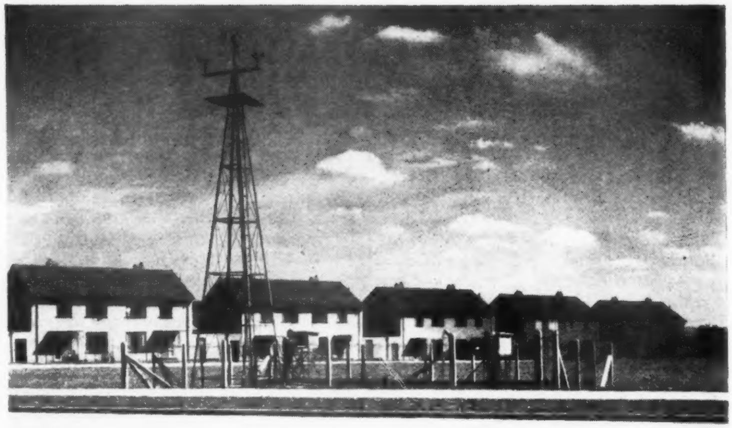


Fig. 1: View of some of the houses

Introduction

In the past there has been little information on the relative economy and amenity of the various methods of providing the space heating, hot water and cooking facilities for houses of around 1,000 sq. ft. floor area. In the report of the Egerton Committee (Post-War Building Study No. 19, *The Heating and Ventilation of Dwellings*) an attempt was made to draw together such information on various combinations of appliances. The committee were, however, well aware that the amount of factual knowledge was inadequate. Chapter VII of their report says, in part, 'There is a lack of authoritative statistical data on which such estimates could be based. . . . It is felt that steps should be taken to collect such statistics related to comparable conditions. Not only would this information be of great value in itself, but it would also provide an essential correlation between . . . the general experience of users of fuel and laboratory work on appliances and calculations based thereon. . . .' The same chapter points out that in selecting between the many different ways of heating a house, of the factors that govern the choice some cannot be measured—such as personal tastes—but others can be stated quantitatively. Estimates were made of the amount of fuel needed to supply the heating services (space heating, water heating and cooking), the capital costs of supplying and installing the various appliances and the labour involved in their use.

This present paper is the first report of experimental work arising from these recommendations, and of the results obtained during the first winter's operation of 20 trial houses built at Abbots Langley for the Building Research Station. It deals primarily with the economics of heating in order to meet the pressing need pointed out by the Egerton Committee, but much additional information of interest to architects, such as ventilation, draughts, temperature distribution, etc. was obtained which will be published in later papers.

The data on which this paper is based were obtained with the houses unoccupied, and experience with the houses occupied is now being gained. The results from this latter period will extend the data to a wider range of usages. The usage applied in the first period is intended to be typical. Therefore it is unlikely that the results from the Unoccupied Period—those considered in this report—will be substantially altered in broad outline. It must, nevertheless, be stressed that this paper is only the initial report on a continuing experiment.

Houses and Systems

The houses consist of ten pairs of semi-detached houses with outbuildings (Fig. 1). They all face west on a plateau between three and four hundred feet above sea level, and save for the shelter they afford one another nothing protects them from the wind. Two types of plan shown in Figs. 2 and 3 had to be used because no one plan was suitable for all the different combinations of appliances. For brevity the 'through-living room' plan, of which there are 16 (Houses 9–22, 33, 34) is called A plan, and the parlour with kitchen-living room, of which there are four (Houses 31, 32, 35 and 36), B plan. Both plans provide accommodation for five people, and have floor areas of 925 sq. ft.

The degree of insulation of all houses is the same. The values are set out in Table I, and compared with the recommendations of the Egerton Committee, from which they differ in that the same degree of insulation was used in houses irrespective of the controllability of the system, and no distinction made between the insulation for the living room and that for the rest of the house.

A method of making comparisons between houses with different degrees of insulation is to give in B.Th.U's. the amount of heat required per hour to maintain a given temperature difference between inside and outside per square foot of floor area. On the usual design basis of 30 degrees F. outside and 60 degrees F. all over the house inside, and allowing the air changes per hour recommended by the Egerton Committee, the heat required for these houses is 20.9 B.Th.U. per square foot for both A and B plans. This can be compared with the requirements per square foot for the houses in the insulation trials by the Building Research Station reported in this JOURNAL in the issues of 13 January 1947 and October 1947. The four different degrees of insulation require 39.3, 30.4, 25.1 and 21.1 B.Th.U's. per hour per square foot of floor area. On this basis these houses appear better insulated than the best of those in the insulation trials, but the former are semi-detached and have less exposed surface than the latter, which are detached.

There are 19 different combinations of appliances for space heating, water heating and cooking. One combination is repeated (Houses 13 and 14) with a view to establishing any difference in fuel consumption as between the northern and southern half of a block of semi-detached houses. Table II shows in detail the appliances installed. The combinations may be divided for convenience in discussion into three categories based on their space heating arrangements called 'Partial', 'Two-Stage' and 'Whole House' Heating.

The characteristics of the 'Partial' Heating group is that the bedrooms, halls and bathrooms are unheated and the kitchens get uncontrolled space heating from the cookers and any water heaters installed; the living rooms are heated by open fires, openable stoves or closeable fires. A plan Houses 20, 21, 22, 33, 34 and B plan Houses 31, 35 and 36 make up this

TABLE I. INSULATION

	U value of houses	Egerton: Controllable apparatus	Egerton: Uncontrollable apparatus
Gr. Fl. (tile finish)	0·20	0·15	0·15
Gr. Fl. (timber finish)	0·15	0·15	0·15
Walls	0·20	Living room 0·15 Elsewhere 0·20	0·20
Roof	0·17	0·20	0·30

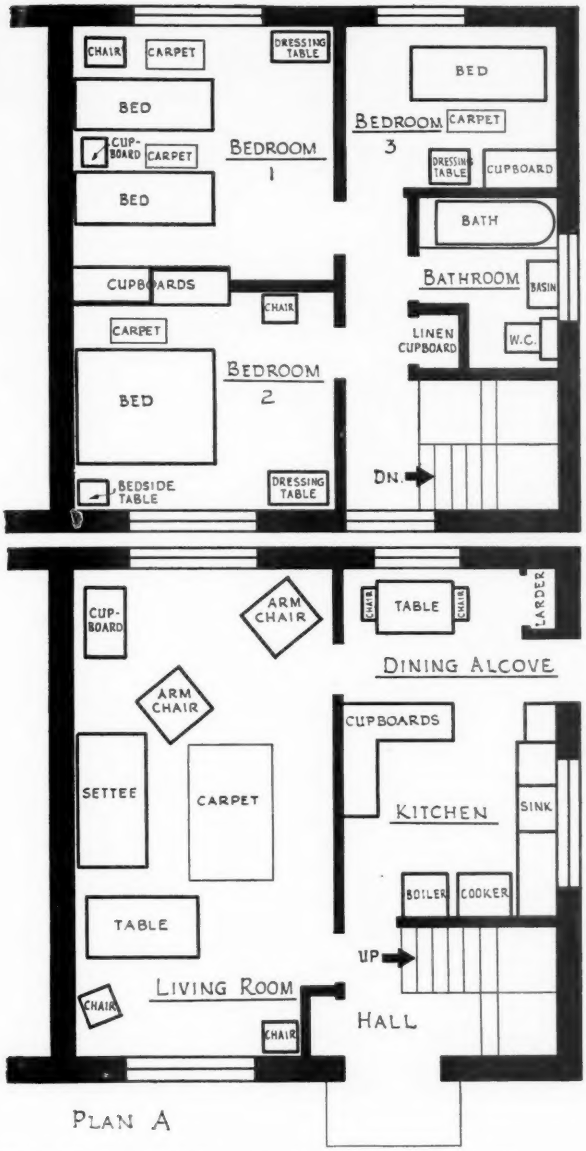


Fig. 2: The through living-room plan. Houses 9-22, 33 and 34

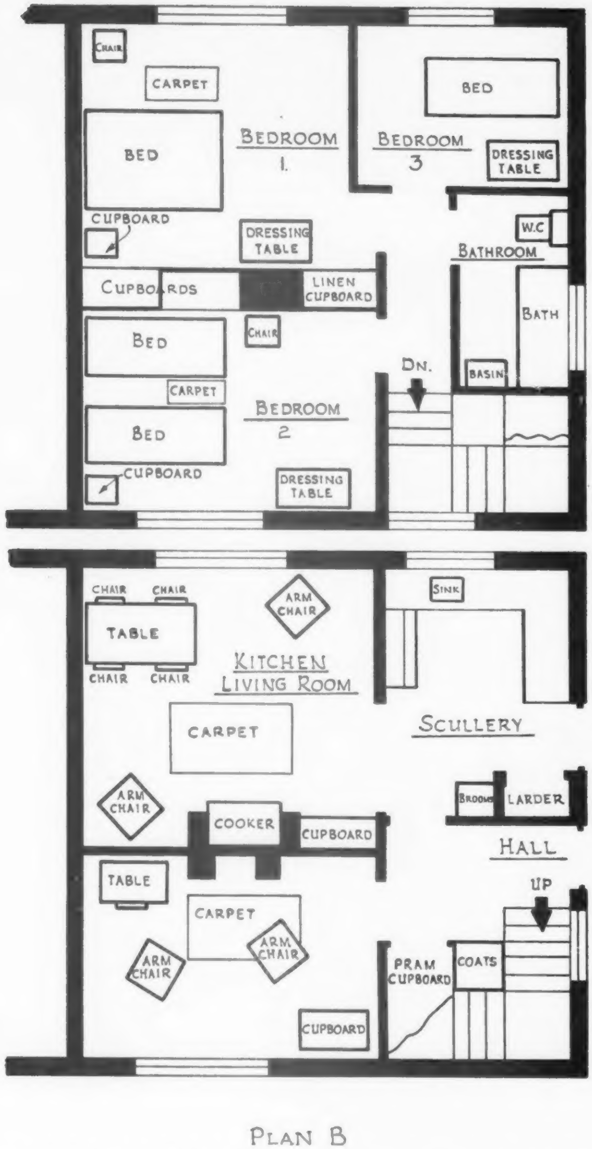


Fig. 3: Parlour with kitchen living-room plan. Houses 31, 32, 35, 36

group. Houses 33 and 34 are experimental controls in that all the appliances included are pre-war models, and the main space heating is supplied by unimproved open fires. In House 31 the back-to-back appliance, which heats the parlour, cooks and heats the water, also convects warm air to one bedroom; this was not considered sufficient to warrant its inclusion in the 'Two-Stage' group. The 'Two-Stage' group relies on the concept of background heating plus topping up, and includes the A plan houses 9, 10, 11, 12, 15, 17 and 18. They correspond to combinations 1, 7, 5, 6, 3, 8 and 2 in Table 7 (4) in Post-War Building Study No. 19. House 32 is also included in this group because background and topping up heat is used, although a more limited heating service is provided. Houses 9, 10, 17, 18 and 32 use convected warm air for background heating, and gas or electric radiant fires for topping up in all the bedrooms. In House 32 the warm air is convected to the two larger bedrooms, but only one of these has topping up. In House 15 the background warmth is supplied by hot water piped to radiators under the windows with electric radiant fires for topping up in living room and all bedrooms. In House 11 convected warm air is taken from a gas convector fire to one bedroom only; all bedrooms have gas radiant fires. In House 12 background heating is supplied to the living room only by electric tubular heaters, and there is a radiant electric fire for topping up; the bedrooms are heated by electric convectors.

The 'Whole House' Heating group consists of various central heating systems in Houses 13, 14, 16 and 19—all A plan houses. Houses 13 and 14 are identical, with radiators under the windows; they are the exposure test and differ only in orientation. House 16 is centrally heated with radiators along or near the spine wall. House 19 is a panel heating system in which convected warm air heats a part of the ground floor and most of the first floor.

The windows are selected from the British Standards sizes and conform to English Joinery Manufacturers' Association Standard in detail. As recommended

TABLE II. SCHEDULE OF APPLIANCES IN EXPERIMENTAL HOUSES

HOUSE				SPACE HEATING					
Code No.	Plan Type	Group	General Description	Living Room or Parlour	Kitchen or Kitchen L-R	Hall	Bedrooms	Bathroom (Towel Rail)	Airing Cupboard
34	A	Partial	Open fire with back boiler	Open fire with back boiler	—	—	—	—	40 gal. H.W. cylinder
33	A	,,	Open fire with domestic boiler	Open fire	Domestic boiler	—	—	—	40 gal. H.W. cylinder
20	A	,,	Open coke fire with solid fuel cooker	Open coke fire	Solid fuel cooker	—	—	—	40 gal. H.W. cylinder
21	A	,,	Closeable fire with back boiler	Closeable fire with back boiler	—	—	—	—	40 gal. H.W. cylinder
22	A	,,	Openable stove with back boiler	Freestanding openable stove with back boiler	—	—	—	—	40 gal. H.W. cylinder
35	B	,,	Oven over fire with back boiler	Open fire in parlour	Oven over fire cooker with back boiler	—	—	—	40 gal. H.W. cylinder
36	B	,,	Combination grate with back boiler	Improved open fire in parlour	Combination grate with back boiler	—	—	—	40 gal. H.W. cylinder
31	B	,,	Back-to-back range	Back-to-back range with boiler		—	Convected warm air to large back bedroom	—	40 gal. H.W. cylinder
32	B	Two-Stage	Heat Service Unit (prefabricated)	Openable inset stove with back boiler	Convected warm air	—	Convected warm air to 2 large bedrooms with gas fire topping up in large back bedroom	—	—
9	A	,,	Closeable fire with convected warm air (with electricity)	Closeable fire	Domestic boiler	Rad. from domestic boiler	Convected warm air with electric fires	From domestic boiler	40 gal. H.W. cylinder
10	A	,,	Closeable fire with convected warm air (with gas)	Closeable fire	—	Gas convector	Convected warm air with gas fires	Gas	Gas convector
17	A	,,	Openable stove with convected warm air (with electricity)	Inset openable stove	—	Electric convector	Convected warm air with electric fires	Electric	Electric
18	A	,,	Openable stove with convected warm air (with electricity) and s.f. cooker	Inset openable stove	Solid fuel cooker with back boiler	Rad. from cooker	Convected warm air with electric fires	From cooker	40 gal. H.W. cylinder
15	A	,,	Background central heating	Rads. under windows	Manually fed boiler	Rad.	Rads. under windows with electric fires	From boiler	40 gal. H.W. cylinder
11	A	,,	Gas heating with solid fuel domestic boiler	Gas radiant	Solid fuel storage boiler	Gas convector	Convected warm air to large front bedroom; gas fires in all	From storage boiler	Coil from storage boiler
12	A	,,	Electric heating with solid fuel domestic boiler	Electric tubular heaters and electric radiant	Solid fuel storage boiler	Electric convector	Electric convectors	From storage boiler	Coil from storage boiler
19	A	Whole house	Warm air panels	Warm air panels (ceiling and floor)	Warm air panel (ceiling) and magazine fed boiler	—	Warm air panels (floor) except in small back bedroom	Warm air panel (floor)	40 gal. H.W. cylinder
16	A	,,	Central heating with interior rads.	Rad. on spine wall	Magazine fed boiler and rad.	Rad.	Rads. on spine wall	From boiler	40 gal. H. W. cylinder
13	A	,,	Central heating	Rads. under windows	Magazine fed boiler and rad.	Rad.	Rads. under windows	From boiler	40 gal. H.W. cylinder
14	A	,,	Central heating	Rads. under windows	Magazine fed boiler and rad.	Rad.	Rads. under windows	From boiler	40 gal. H.W. cylinder

HOT WATER	COOKER
Back boiler in living room fire	Gas
Domestic boiler in kitchen	Gas
Back boiler in cooker	Solid fuel
Back boiler in living room fire and multi-point gas heater	Gas
Back boiler in living room fire	Gas
Back boiler in cooker	Solid fuel
Back boiler in combination grate	Solid fuel
Back boiler in range	Solid fuel or gas
40 gal. H.W. cylinder in H.S.U. from back boiler or gas circulator	Gas (in scullery)
Domestic boiler in kitchen	Gas
Gas storage boiler	Gas
Electric storage boiler	Electric
Back boiler in cooker	Solid fuel
Boiler	Electric
Solid fuel storage boiler	Gas
Solid fuel storage boiler	Electric
Magazine fed boiler	Electric
Magazine fed boiler	Electric
Magazine fed boiler	Electric
Magazine fed boiler	Electric

by the Egerton Committee (para. 8.2), a small vent light is provided in each window near the ceiling. Every habitable room has a fresh air inlet and outlet, but these do not give directly to the outside. The basic principle shown in Fig. 4 is demonstrated in the houses with central heating. Air is drawn into the hall through a grille beside the front door; the living room draws on the hall through a grille over the door and vents to the roof by a duct beside the cupboards on the first floor. The bedrooms draw air from the upstairs hall by grilles over the doors and vent to the roof space by grilles over the cupboards. The kitchen has no provision for air entry, but is vented by a duct around the boiler flue. The larder and bathroom are vented by air bricks to the outside. If convected air is ducted to a bedroom or combustion air to near a living room appliance, then the grilles over the doors to the hall are omitted. When a living room has in it a gas or solid fuel appliance or a bedroom a gas appliance, exhaust takes places through the flue, and the vent to the roof space is omitted. Before the trials started two latches had to be fitted to each window to overcome warping; the resulting fit is said by builders and joinery experts who have visited the site to be representative of that achieved in practice today. During the trials the exterior doors were weather stripped to reduce the excessive draughts in the halls.

The experiment is divided into two periods. During the first—the Unoccupied Period—the houses were furnished and run to the same routine by laboratory staff, while during the later Occupied Period the houses are being rented unfurnished to local authority tenants. The later period is now in progress and will last for some years; the Unoccupied Period began on 28 September 1947 and finished by 27 March 1948.

The routine used during the Unoccupied Period was based upon the Egerton Report. A family of four—parents and two children of school age—were imagined to live in each house, and all families were assumed to lead strictly regulated lives. Laboratory assistants replaced the housewives, and they drew off the equivalent of 250 gallons of water at 140 degrees F. each week; they kept living rooms at 65 degrees F. for eight hours a day, the kitchen at 60 degrees F., and heated bedrooms as far as the appliances installed would permit, operated the cooker three times a day, and so on. The detailed breakdown of the routine was prepared in consultation with the staff of the Chief Scientific Adviser's Division of the Ministry of Works, who in turn drew partly on their own experience and partly on advice from gas and electricity undertakings. The routine was kept running from 7.30 a.m. to 10.30 p.m. every day, including Sundays and holidays.

At all times, gas, solid fuel or electricity consumed by each appliance was recorded. Individual meters were used for the gas and electric appliances, while solid fuel was weighed out into 5 lb. tins and delivered to the houses. Six grades of solid fuel were used—anthracite french nuts, anthracite boiler nuts, anthracite beans, coal and kitchen nuts and coke, each appliance burning the most suitable fuel. It was of a grade that it is hoped will be in fairly wide use within the next ten years, and was supplied by the Fuel Research Station, where it was bulk sampled and tested. When burnt, the ash was returned to the Fuel Research Station for analysis. Measurements were taken of the heat lost up the flues.

A meteorological station on the site provided records of air temperature, grass temperature, rainfall, hours of bright sunshine, and direction and speed of wind. The records taken here show that the winter of 1947-48 was not unusually mild. The mean winter temperature at Abbots Langley last winter was 45.1 degrees F.; while the average winter temperature at Kew for the last 60 years was 44.4 degrees F. It is not enough, however, to know average temperatures; some idea must be obtained of how a house behaves after a few days of frosty weather. The weeks of 24 November to 1 December and 16 February to 23 February were the cold spells of last winter and can be used to see what happened when average weekly temperatures of 32.9 degrees F. and 30.6 degrees F. occurred.

For the Occupied Period everything had to be arranged so that the tenants would be able to lead their normal lives without interruption by staff taking measurements. To meet this requirement resistance thermometers which were remotely recording were installed; these were similar to those used in the insulation trials reported in this JOURNAL, October 1947. With these thermometers shielded from radiation air temperatures were taken in every room at the same point in each house. The use of air temperature was a matter of necessity because measurements had to be made in over 200 rooms. The view is taken that the object of a heating appliance is to heat the whole room and not just a part in front of the fire. At the measuring point selected in the living room the equivalent temperature differs from the air temperature by less than 1 degree F. in general. Humidity was not measured during the Unoccupied Period as it had no meaning in unoccupied houses where only simulations of the cooking or laundry were being carried out. Windows were kept shut and doors only opened to allow staff to go about their work, but instruments have been developed for use with the remote recorders that will show the position of doors and windows when the houses are occupied.

Survey parties moving from house to house augmented this system. Air change was measured by allowing a mixture of hydrogen and air to escape into the room. This was thoroughly mixed up with the air in the rooms by fans. Katharometers were used to detect the amount present, and from the rate at which it disappeared the air change was calculated. During the Unoccupied Period ¼ in. copper tubing was

installed in all houses which will permit similar measurements to be taken from outside the house during the Occupied Period without disturbing the tenant. Helium will be used instead of hydrogen in the later period. Air movement was first roughly assessed by using smoke as a tracer and, from the indications given by the smoke, positions for measuring the air currents by hot wire anemometers were established. The pattern of radiation from all high temperature radiant heaters was established by contrasting the readings from globe thermometers equipped with resistance elements with that of resistance elements protected from all radiation. All living rooms were surveyed in detail with 150 thermocouples disposed at various points and levels, including surface temperatures. From these isothermal plans (contour maps of temperature variations) have been prepared. To establish the effect that the appliances had on the decorations, measurements with photo-reflectometers were taken at monthly intervals at certain points in each house. These are being continued in the next period. To assess work content of tending the appliances a time study was made of this part of the laboratory assistants' work.

Thermal Characteristics

The first characteristic of these houses which emerged was that they did not cool down more than 5 degrees to 7 degrees over night. In the routine proposed by the Egerton Committee (para. 7.2.2.4) for their calculations of the fuel requirements, allowance was made for a minimum temperature of between 45 degrees F. and 50 degrees F., representing an over-night drop of 15 degrees. This difference between observed and assumed temperatures is due partly to the increased thermal insulation. There is no doubt that when houses are built so that damp is excluded, and insulated to Egerton standards, the conditions inside are much improved even with pre-war methods of heating. The maintaining of temperature occurred even after over-night burning appliances were banked or open fires tended for the last time and allowed to go out.

Detailed consideration of the comfort conditions in the houses would be too large a subject for this report, but Table III shows some of the data which can serve as a basis for comparison between the heat service provided in the various houses. Included in the table are the seasonal mean house temperature, mean living room and mean bedroom temperatures, and also the living room temperature at five o'clock in the evening and the temperature in the large back bedroom at nine o'clock in the evening of 30 November 1947, when the mean temperature for the day was 26.2 degrees F. The houses are arranged in three groups, and within the groups are in order of anticipated heat service starting with the minimum. Broadly speaking the space heating actually obtained improves substantially from 'Partial' to 'Whole House' Heating. There is, however, no great difference between the 'Two-Stage' and the 'Whole House' Heating systems except that in very cold weather the 'Whole House' Group gives the better conditions. These differences in service provided by the three groups must be borne in mind when the economics of the heating systems are considered; that a system is relatively cheap from the point of view of capital or running costs should not be allowed to obscure the fact that the service provided may also be relatively poor.

TABLE III. HOUSE TEMPERATURES

House No.	Heating System	House Mean	Mean Living Room	Mean Bedrooms	Living Room at 17·00 hrs. on 30/11/47	Second Bedroom at 21·00 hrs. on 30/11/47
		° F.	° F.	° F.	° F.	° F.
34	Partial	52·9	59·5	50·0	53·0	42·0
33	,,	56·5	61·3	51·4	59·0	42·0
20	,,	59·3	61·8	52·8	61·5	46·0
21	,,	56·3	60·7	53·1	57·5	45·0
22	,,	55·7	61·2	52·8	55·5	45·0
35	,,	56·1	63·9	53·7	64·0	46·0
36	,,	55·5	61·6	53·6	65·0	45·0
31	,,	55·7	63·3	55·7	57·0	48·0
32	Two-Stage	51·2	57·3	50·5	49·0	41·0
9	,,	58·8	62·3	54·7	59·0	48·0
10	,,	56·9	60·8	54·9	59·0	52·5
17	,,	56·9	60·5	56·6	56·0	48·5
18	,,	64·4	64·9	59·4	58·5	55·0
15	,,	59·9	61·4	56·7	63·5	51·0
11	,,	58·5	60·2	53·7	61·5	54·5
12	,,	58·6	59·6	53·9	64·0	51·0
19	Whole House	58·6	61·0	54·2	58·0	48·5
16	,,	60·4	62·4	56·6	63·0	54·0
13	,,	59·9	61·1	57·3	63·5	51·5
14	,,	59·6	61·8	57·1	64·0	51·0

The temperatures on the cold day included in Table III show that even in the 'Partial' Heating Group which have unheated bedrooms the temperatures were nowhere near freezing. This is due to the improved insulation (shown in Table I). In houses with poorer standards of insulation such as were practised before the war and are still largely current, the temperatures in unheated rooms such as bedrooms would undoubtedly be considerably lower.

During the experiment the windows were shut all the time, and the doors only opened to allow access about once every hour during the day. This, of course, is not typical of an occupied house, but it is a simple method of providing a standard condition against which the many variations of door and window positions can be judged. Studies on these variations are now in progress; this report is confined to the standard conditions of doors and windows closed, and is but a very brief summary of a very large subject. After weather stripping the exterior doors the average air change for all houses is between 2.0 to 2.5 per hour, and for each house is almost the same regardless of the type of heating system, because the entry of air is restricted to the infiltration through cracks or to the vents and ducts provided. The effect of weather stripping the exterior doors was found to reduce the average air change from 2.9 air changes per hour to 2.4 air changes per hour in centrally heated houses. On the basis of the Egerton Committee recommendations the average air change required is equivalent in these houses to an overall exchange rate of 1.2 per hour. The average wind speed for the Unoccupied Period, taken on the Meteorological Site was 9.6 miles per hour compared with 9.7 miles per hour average for the last 14 years at Kew. The rate of air change varies partly with the house under consideration and partly with the speed of the wind; for these houses the rate of air change increases by 0.1 per hour for every one mile an hour increase in wind speed. From the data available the number of therms required for each air change can also be calculated. Selecting one example from each group of heating systems, the therms required in a heating season for one air change per hour with the temperatures actually observed are 151 for the Partial System (House 33), 151 for the Two-Stage System (House 10), and 152 for the central heated house (House 13). In these figures allowance is made for the efficiency of the heating systems, that is they are the 'input therms'.

Appraisal of Capital Costs

That there is a wide range in the cost of equipping houses for space heating, domestic hot water heating and cooking has always been appreciated, but comparative figures have not been easy to obtain. The costs of building the 20 trial houses at Abbots Langley are no guide because special conditions surround their building. Experimental work was done during the erection of the external and party walls; the building period included the severe winter of 1946-7, and materials and labour were not easily available. With 19 different systems to install, any hopes of comparative costing disappeared because failure of delivery or fit of any part of a system in one house upset the whole site routine and trades had to return to make good and to complete work on a purely opportunist basis.

The Chief Scientific Adviser's Division of the Ministry of Works offered a solution.

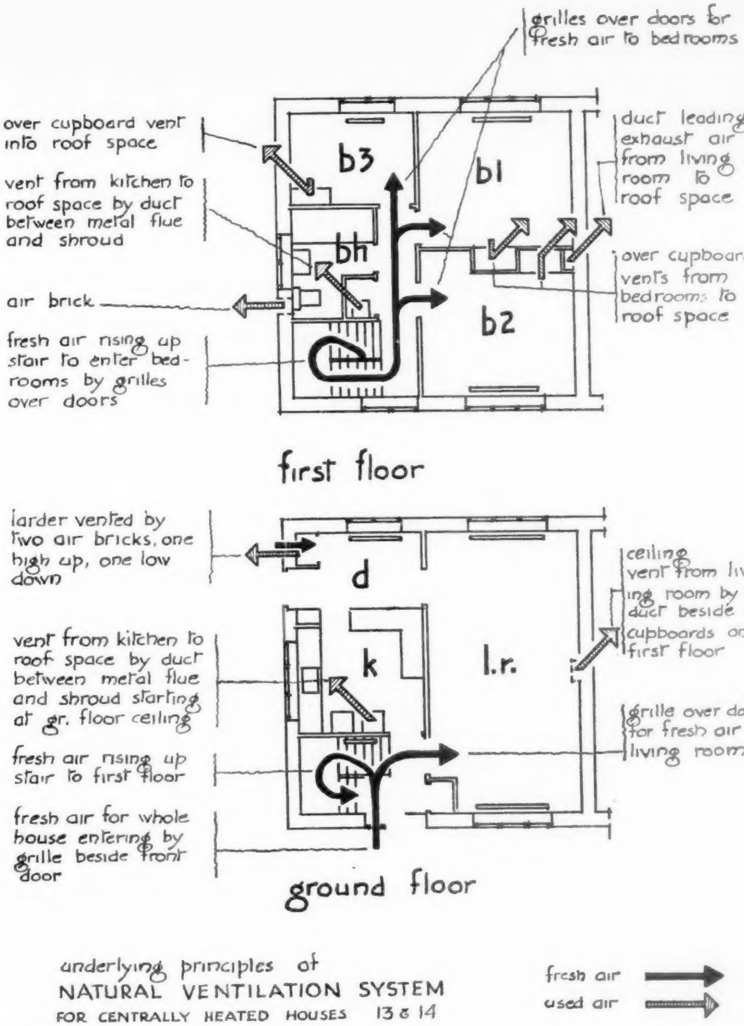


Fig. 4

Key to House Types

9, A Two-stage: closeable fire with convected warm air (with electricity). 10, A Two-stage: closeable fire with convected warm air (with gas). 11, A Two-stage: gas heating with solid fuel domestic boiler. 12, A Two-stage: electric heating with solid fuel domestic boiler. 13, A Whole House: central heating. 14, A Whole House: central heating. 15, A Two-stage: background central heating. 16, A Whole House: central heating with interior rads. 17, A Two-stage: openable stove with convected warm air (with electricity). 18, A Two-stage: openable stove with convected warm air (with electricity and s.f. cooker). 19, A Whole House: warm air panels. 20, A Partial: open coke fire with solid fuel cooker. 21, A Partial: closeable fire with back boiler. 22, A Partial: openable stove with back boiler. 31, B Partial: back-to-back range. 32, B Two-stage: heat service unit (prefabricated). 33, A Partial: open fire with domestic boiler. 34, A Partial: open fire with back boiler. 35, B Partial: oven over fire with back boiler. 36, B Partial: combination grate with back boiler.

One section had been studying the costs of alternative and traditional methods of house construction, and this had acquired, during the last three years, a knowledge of the costs of building on a number of sites in many parts of the country. They had also developed a costing system that permits the segregation of the costs of the various components. They undertook to appraise the costs of the trial houses using this system to separate the costs of the heating equipment from that for the remainder of the house.

As the nature and scope of a building contract affects the prices used some fairly representative basis had to be imagined. It was treated as if a unit of 50 houses of each combination of heating, cooking and hot water heating appliances were being built for a local authority on a site in the outskirts of Greater London. A contract for 50 houses would define the trade discounts when pricing building materials of the normal run—such as bricks and tiles—but for specialist items it would not be large enough to ensure economic production, nor competitive pricing. Therefore it was assumed that this contract of 50 houses was not the only one calling for these appliances or material. Actual costs of prototypes or units in small production were set aside in favour of probable costs if in economic production. Price adjustments of this nature were kept to a minimum and made in consultation with the manufacturers.

The man-hour content for each operation was based on the information obtained by the detailed observation on other housing sites. These were priced at the appropriate Grade A basic wage rates to which were added health and unemployment insurance, holidays with pay, guaranteed week, site supervision, watchman, plant, plant maintenance, etc. Water for the works, fire and common law insurance are added in bulk to each house cost. Not included in the figures are the contractor's profit, headquarters' administration, allowances for travelling time and fares, overtime or incentive bonus scheme. In short, these may be taken as the contractors site costs. The figures must not be treated as if they represented an authoritative figure which heating equipment should cost, even when many conditions are the same as those outlined; their whole value is that they are comparative. Because the basis on which the costs were prepared was observed data on other sites the term estimates has been set aside in favour of 'Cost Appraisals'.

The walls of each block of houses are of a different combination of concrete blocks, bricks and insulating material, for during construction measurements were made of the work content of building these components from these different materials; the results of these have been reported in Technical Paper No. 1 of the National Building Studies. The costs of the different wall constructions could obscure the differences between the costs of the heating equipment. To overcome this only one wall construction has been assumed, that used in Houses 33 and 34. This is an 11 in. cavity brick wall of which the exterior leaf is facing brick and the interior is lined with 1 in. of wood wool set on a screed, finished with ⅝ in. hard plaster. This house was measured, billed and costed through as the 'Basic House' to give a figure for all those factors that the houses have in common. This excludes appliances of all types, flues, vents and ducts, the hot water service, and any additions to the gas, electric or cold water services over the minimum supplied.

Although all the prices are based upon measurements taken on the site in order to ensure that the houses costed were the

houses used, a further substantial alteration between the existing houses and the costs as reported here has been made. In all houses except Houses 31, 35 and 36 metal flues are installed for solid fuel appliances. These are shrouded for fire protection with clinker block or with asbestos cement on a metal frame in the house, and in the roof space with sheet metal. Where clinker block is used, metal access panels for maintenance are provided on each floor. It was found that by substituting brick flues savings of between £15 and £37 on the site costs of a house can be effected, and the savings on these charges have been incorporated in the figures. Brick has not been substituted where the metal flue was used to help warm convection air—as in Houses 9, 10, 17 and 18; metal is retained up to the point where heat is no longer taken from the flue. The chimney from the kitchen in the A plan houses is cranked across in the roof to join the main flue in the flue cap, and there is no support for a brick flue in the first floor. It was assumed that the flue sprang from a slab of reinforced concrete in the first floor and ran straight up through the roof to a point 3 ft. above the ridge. Visually and structurally this is not very satisfactory, but it is the cheapest compromise available. This substitution was made only in A plan houses. All B plan houses were built with brick flues except House 32, where the metal flue and the metal shroud are integral parts of the Ministry of Works Heating and Plumbing Unit. There is little doubt but that a greater saving could have been effected had the A plan houses been designed with brick flues.

Fig. 5 shows the comparative costs of the heating equipment of the different combinations, and covers those items not accounted for in the 'Basic House' (heating appliances, flues, vents, ducts, hot water service and additions to the cold water, gas and electrical systems above the minimum). The difference in the appraised costs of equipping the houses runs from £88 to £213. Three shades of grey are used to differentiate between the different groups of heating systems, 'Partial', 'Two-Stage' and 'Whole House' heating. The costs of the houses follow fairly closely the different categories. Considering the A plan houses, the 'Partial' group run from £88 up to £122, the 'Two-Stage' from £160 up to £198, excluding House 12, which is amongst the 'Partial' group at £131, but it is largely an electric house and therefore the equipment is cheap to install. The dearest of the A plan 'Two-Stage' houses is 15, with background heating by hot water in radiators. This is more expensive than the cheapest of the 'Whole House' group, which is House 16, with the radiators on the spine wall and costs £192. Houses 13 and 14 centrally heated by radiators under windows are the most expensive of all at £213. House 19, heated by warm air panels, costs £206.

TABLE IV. ANNUAL FUEL CONSUMPTION

Hse.	Item	Location	Period	Fuel	Consumption	Thermal Input (Therms)	Total Thermal Input
9	Heating	LR	Winter	Coal	5,180 lb.	668	
	Background	B1, 2, 3					
	Topping up	B1, 2, 3	Winter	Electricity	361 kWh	12	
	Hot water	KI	Year	Boiler Nuts	7,070 lb.	1,030	
	Cooking	KI	Year	Gas	10,560 c.ft.	53	1,763
10	Heating	LR	Winter	Coal	5,300 lb.	683	
	Background	B1, 2, 3					
	Topping up	B1, 2, 3	Winter	Gas	6,510 c.ft.	33	
	Linen Cupboard		Year	Gas	5,200 c.ft.	26	
	Towel airer		Year	Gas	6,240 c.ft.	31	
	Background	HA	Winter	Gas	2,110 c.ft.	11	
	Cooking	KI	Year	Gas	10,560 c.ft.	53	
	Hot water	KI	Year	Gas	63,960 c.ft.	320	1,157
11	Heating	LR	Winter	Gas	54,600 c.ft.	273	
	Background	B1					
	Hot water		Year	Boiler Nuts	6,340 lb.	921	
	Cooking		Year	Gas	10,560 c.ft.	53	1,247
12	Heating	LR	Winter	Electricity	3,060 kWh	104	
	Heating	B1, 2, 3	Winter	Electricity	1,222 kWh	42	
	Background	HA	Winter	Electricity	795 kWh	27	
	Hot water	KI	Year	Boiler Nuts	7,130 lb.	1,037	
	Cooking	KI	Year	Electricity	952 kWh	33	1,243
13	Heating	Whole House	Winter	Anthracite Beans	6,960 lb.	992	
	Hot water						
	Hot water	KI	Summer	Anthracite Beans	1,900 lb.	271	
	Cooking	KI	Year	Electricity	988 kWh	34	1,297
14	Heating	Whole House	Winter	Anthracite Beans	6,480 lb.	924	
	Hot water						
	Hot water	KI	Summer	Anthracite Beans	1,900 lb.	271	
	Cooking	KI	Year	Electricity	988 kWh	34	1,229
15	Heating (Background) Hot water	Whole House	Winter	Boiler Nuts	8,030 lb.	1,168	
	Topping up	LR	Winter	Electricity	168 kWh	6	
	Topping up	B1, 2, 3	Winter	Electricity	171 kWh	6	
	Hot water	KI	Summer	Boiler Nuts	2,750 lb.	400	
	Cooking	KI	Year	Electricity	952 kWh	32	1,612
16	Heating	Whole House	Winter	Anthracite Beans	6,390 lb.	911	
	Hot water						
	Hot water	KI	Summer	Anthracite Beans	1,900 lb.	271	
	Cooking	KI	Year	Electricity	993 kWh	31	1,213
17	Heating	LR	Winter	French Nuts	5,030 lb.	730	
	Background	B1, 2, 3					
	Topping up	B1, 2, 3	Winter	Electricity	114 kWh	4	
	Background	HA	Winter	Electricity	830 kWh	28	
	Linen Cupboard		Year	Electricity	624 kWh	22	
	Towel Rail		Year	Electricity	728 kWh	25	
	Hot water	KI	Year	Electricity	4,326 kWh	148	
	Cooking	KI	Year	Electricity	952 kWh	32	989

Heating Service

As a complete record was kept of all fuel consumed it is possible to obtain the annual running costs of the systems, but when considering these outgoings the services covered by them—space heating, water heating and cooking—must be taken into account to obtain a balanced view. No combination failed to supply the hot water load of 250 gallons a week at 140 degrees F. —the amount proposed in the Egerton Report—so that in respect of that service all the houses are equal. The cooking load was arranged as fairly as could be managed in the absence of reliable data on comparative consumptions. Still it is possible that there may be some inequalities, particularly in the matter of solid fuel cookers. The requirements for the load on the electric and gas cookers were experimentally determined from the information supplied by housing managers, which was given in terms of 'boil so much water on this ring' and so forth, but the load for the solid fuel cookers was purely *ad hoc* and consisted of burning away five pounds of fuel fast to represent the cooking of each meal. Pending further information, which should emerge from the Occupied Period, the cooking loads can only be assumed to have given satisfactory and similar service.

The chief difference then between the houses in the service obtained lies in the

TABLE IV—*continued*

18	Heating	LR	Winter	French Nuts	5,300 lb.	769	
	Background	B1, 2, 3					
	Topping up	B1, 2, 3	Winter	Electricity	80 kWh	3	
	Cooking	KI	Year	French Nuts	9,980 lb.	1,448	2,220
	Hot water						
19	Heating	Whole House	Winter	Anthracite Beans	6,390 lb.	911	
	(Background)						
	Hot water						
	Topping up	LR	Winter	Electricity	903 kWh	31	
	Hot water	KI	Summer	Anthracite Beans	1,900 lb.	271	
	Cooking	KI	Year	Electricity	952 kWh	32	1,245
20	Heating	LR	Winter	Coke	3,000 lb.	334	
	Fire Lighting	LR	Winter	Gas	5,080 c.ft.	25	
	Hot water	KI	Year	French Nuts	10,820 lb.	1,570	1,929
21	Heating	LR	Winter	Coke	6,290 lb.	700	
	Hot water						
	Fire lighting	LR	Winter	Gas	17,030 c.ft.	85	
	Hot water	LR	Summer	Gas	19,000 c.ft.	95	
	Cooking	KI	Year	Gas	10,200 c.ft.	51	931
22	Heating	LR	Winter	Boiler Nuts	6,060 lb.	881	
	Hot water						
	Hot water	LR	Summer	Boiler Nuts	2,190 lb.	318	
	Cooking	KI	Year	Gas	10,970 c.ft.	55	1,254
31	Heating	KLR, PA	Winter	Coke	9,870 lb.	1,098	
	Background	B1					
	Cooking						
	Hot water						
	Hot water	PA	Summer	Coke	2,280 lb.	254	
	Cooking	KLR	Summer	Gas	3,720 c.ft.	19	1,371
32	Heating	KLR, PA	Winter	Coke	6,400 lb.	712	
	Background	B1, 2					
	Hot water						
	Hot water	KLR	Summer	Gas	26,600 c.ft.	133	
	Cooking	KI	Year	Gas	9,670 c.ft.	48	893
33	Heating	LR	Winter	Coal	4,260 lb.	549	
	Hot water	KI	Year	Boiler Nuts	6,810 lb.	990	
	Cooking	KI	Year	Gas	9,460 c.ft.	47	1,586
34	Heating	LR	Winter	Coal	5,880 lb.	758	
	Hot water						
	Hot water	LR	Summer	Coal	1,900 lb.	245	
	Cooking	KI	Year	Gas	9,670 c.ft.	48	1,051
35	Heating	KLR	Winter	Kitchen Nuts	7,550 lb.	978	
	Cooking						
	Hot water						
	Cooking	KLR	Summer	Kitchen Nuts	3,800 lb.	492	
	Hot water						
	Heating	PA	Winter	Coal	2,850 lb.	367	1,837
36	Heating	KLR	Winter	French Nuts	9,330 lb.	1,354	
	Cooking						
	Hot water						
	Cooking	KLR	Summer	French Nuts	3,880 lb.	551	
	Hot water						
	Heating	PA	Winter	Coal	2,450 lb.	327	2,232

Key to House Types

9, A Two-stage: closeable fire with convected warm air (with electricity). 10, A Two-stage: closeable fire with convected warm air (with gas). 11, A Two-stage: gas heating with solid fuel domestic boiler. 12, A Two-stage: electric heating with solid fuel domestic boiler. 13, A Whole House: central heating. 14, A Whole House: central heating. 15, A Two-stage: background central heating. 16, A Whole House: central heating with interior rads. 17, A Two-stage: openable stove with convected warm air (with electricity). 18, A Two-stage: openable stove with convected warm air (with electricity and s.f. cooker). 19, A Whole House: warm air panels. 20, A Partial: open coke fire with solid fuel cooker. 21, A Partial: closeable fire with back boiler. 22, A Partial: openable stove with back boiler. 31, B Partial: back-to-back range. 32, B Two-stage: heat service unit (prefabricated). 33, A Partial: open fire with domestic boiler. 34, A Partial: open fire with back boiler. 35, B Partial: oven over fire with back boiler. 36, B Partial: combination grate with back boiler.

space heating, and may be taken as the temperatures maintained in the houses during the period of the experiment. The criterion used for the amount of space heat is the 'mean house temperature' taken over the Unoccupied Period. This is the average of the temperatures of living room, dining space, kitchen, hall, bedrooms and bathroom. In Figs. 6, 7 and 8, which relate to annual costs, the mean house temperatures maintained are indicated by the introduction of a secondary scale and by the insertion of a half tally on the chart. As indicated previously, these mean house temperatures should not be taken as mo e than an index of warmth because the heat may not be reasonably distributed in the house. For example in House 18, which appears to give an excellent heat service, much of the extra is surplus wild heat mainly in the kitchen, which with closed windows averaged 79.5 degrees F. House 32 shows the lowest mean house temperature of 51.2 degrees F., and House 34 the next at 52.9 degrees F.

Running Costs

Table IV shows the amounts of fuel which would be consumed during a whole year of operation in Southern England. These are obtained by basing the calculations on the figures gathered during the Unoccupied Period rather than making direct comparison of the results obtained during last winter. The observed weekly fuel consumptions were related to mean weekly outside temperature and wind speed, which are the dominant climatic factors that influence the fuel requirements. The weekly fuel consumptions for the main heating appliances are expressed by an equation of the form: $F = a + b\ (T_1 - T_0) + cV\ (T_1 - T_0)$, where a, b and c are constants peculiar to each house and heating system, T_1 is the mean weekly living room temperature, T_0 the mean weekly outside temperature, and V is the mean weekly wind speed. As the average values for outside temperature (T_0) and wind speed (V) are known for Kew over a long period, the fuel required for heating during an average winter at Kew can be obtained by substitution of appropriate values. To these figures for space heating must be added the consumptions for water heating and cooking; wherever possible the estimates are based on the experimental data.

To arrive at running costs, prices for the same region as that for the cost appraisals are used. Table V shows the prices for the different fuels, which are those charged to the tenants now living in the experimental houses. These are not the prices prevailing locally in the area of the houses, but ones which are representative of prices over the Greater London area, and were arrived at in consultation with the Ministry of Fuel and Power and the Gas and Electricity undertakings, and are representative of prices at 1 April 1948.

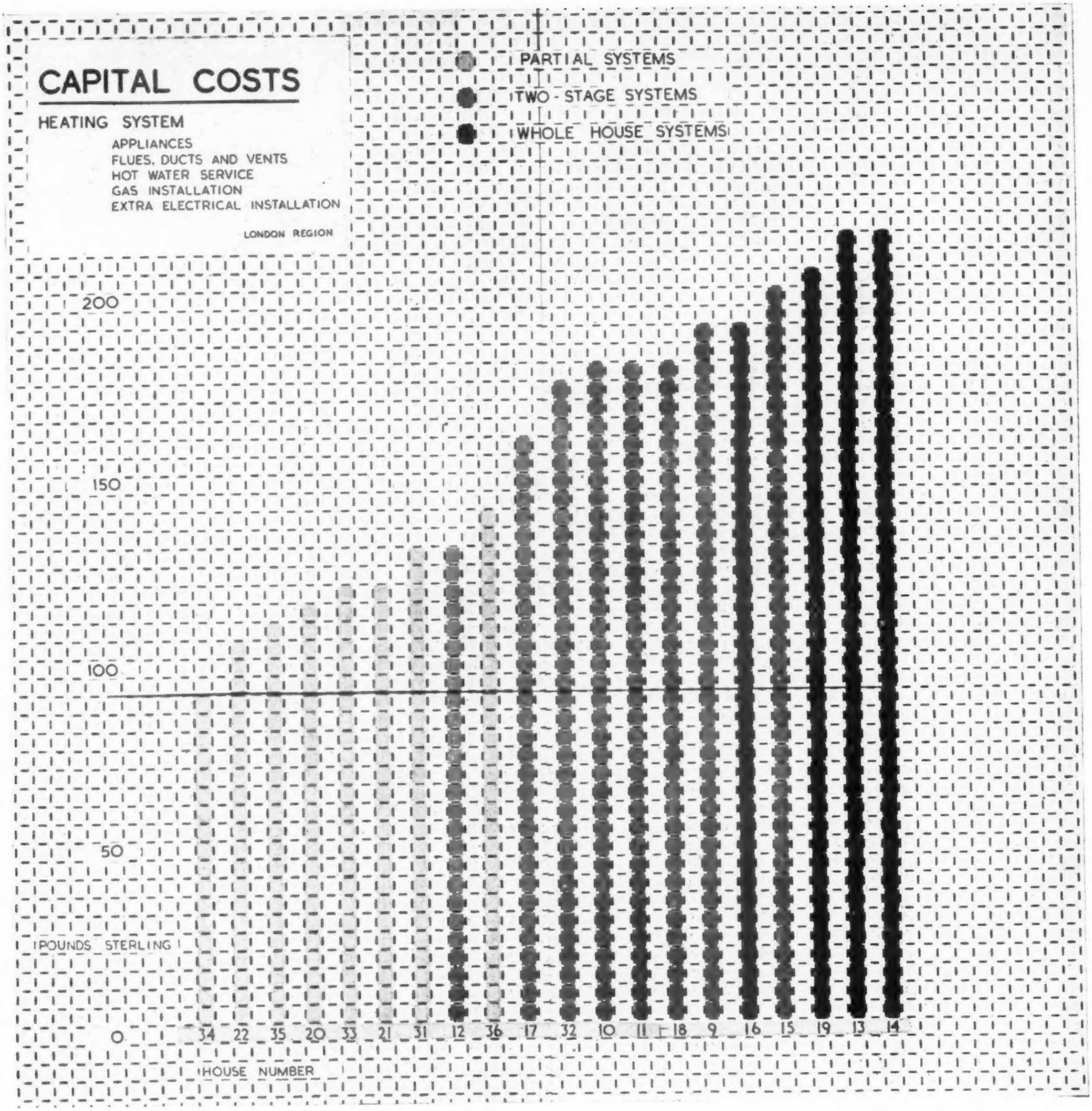


Fig. 5: Appraised capital costs of heating systems; London region

TABLE V. FUEL PRICES

Electricity	1*s.* 0*d.* a week plus $\frac{3}{8}$*d.* a unit.
Gas	1*s.* 0*d.* a week plus 11*d.* a therm.
Gas—Houses 9, 20, 22, 31, 33, 34	2*d.* a week plus 1*s.* 3*d.* a therm.
Coal	90*s.* 4*d.* a ton.
Coal—Kitchen Nuts	85*s.* 10*d.* a ton.
Coke	92*s.* 8*d.* a ton.
Anthracite—French Nuts	123*s.* 9*d.* a ton.
Anthracite—Boiler Nuts	110*s.* 1*d.* a ton.
Anthracite—Beans	116*s.* 1*d.* a ton.

It will be realized that the discussion is now limited to the Greater London area, for the weather on which the fuel consumption is based as well as the costs themselves are all for that region. To what extent the data can be extended to cover other areas is being examined.

Fig. 6 shows the annual fuel costs for the experimental houses. As in the previous figure, the distinction between the three different groups of systems is made by the greys. The grouping shows the 'Partially-Heated' houses on the left, the cheapest, with the 'Whole-House' Heating group

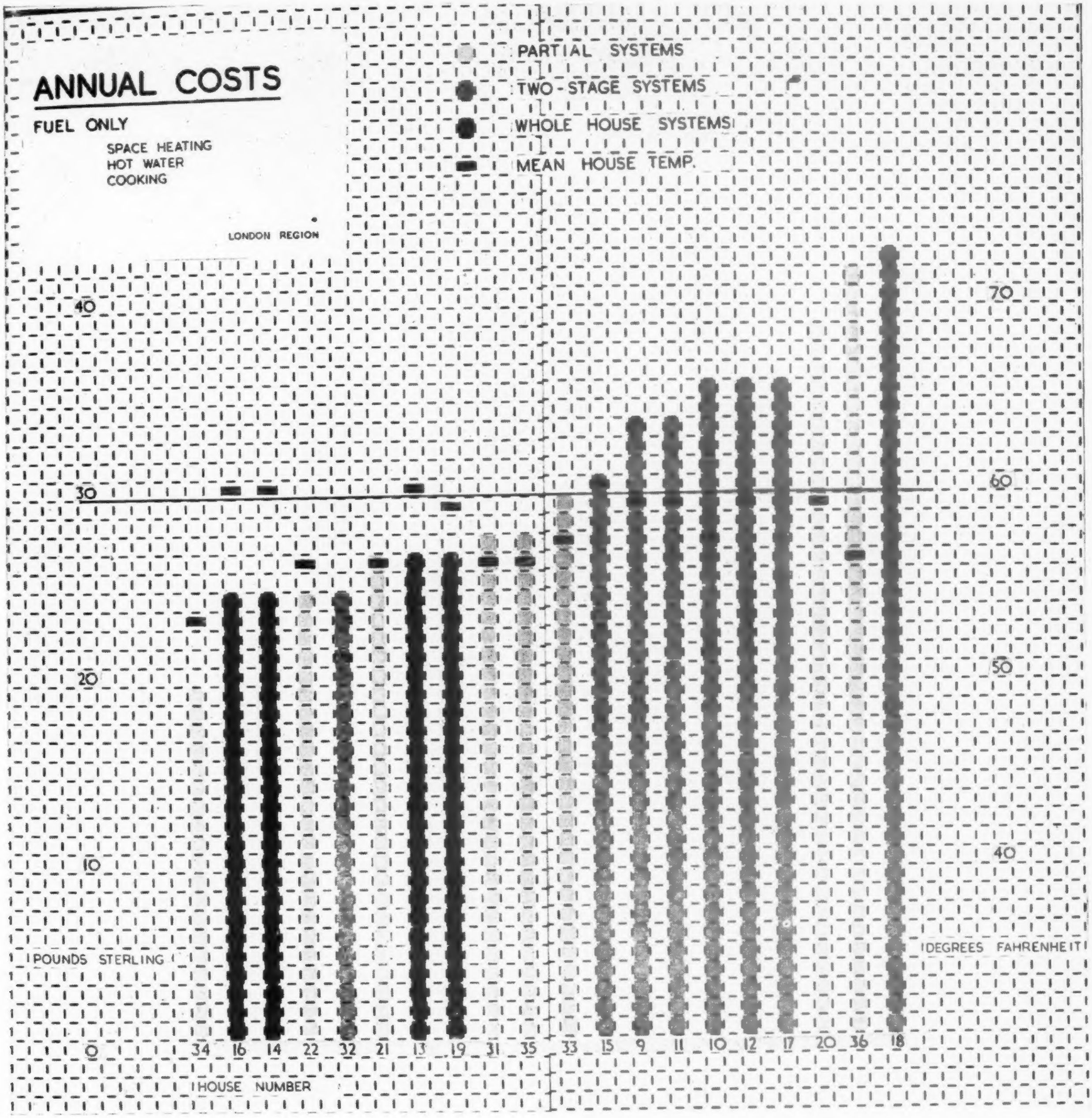


Fig. 6: Annual fuel costs; London region

intermingling with them at the more expensive end of the group; the 'Two-Stage' houses lie on the right-hand side as the most expensive, except House 32, which is in amongst the 'Partially-heated' houses.

In order to obtain a picture in which both capital and running costs are reflected the difference between the capital costs of the cheapest installation (House 34) and any other house must be expressed as the annual amount required to amortise this excess. The extra sum may be regarded as rent chargeable for a more expensive heating system. In noting that House 34 has the cheapest heating system, it should be realized that although the system is roughly similar to pre-war installations it differs from them in that no fireplace or flue is provided in any room but the living room. A pre-war house would have had additional flues, and perhaps gas or electric appliances in the bedrooms and sometimes in the kitchen. The use of these would have been essential to achieve even the conditions of House 34 in a house whose insulation fell below that of these experimental houses which are representative of the post-war objectives. While many rates and periods of amortisation might apply, two have been selected—a loan period of 60 years at 2½ per cent as representative of a typical loan from the Ministry of Health to a Local Authority and a period of 20 years at 4 per cent as representative of a loan from a Building Society to a private owner. The amortisation of these terms is added to the running costs in Figs. 7 and 8. The order of the houses are rearranged to give the grade from cheapest to most expensive. Two other charges

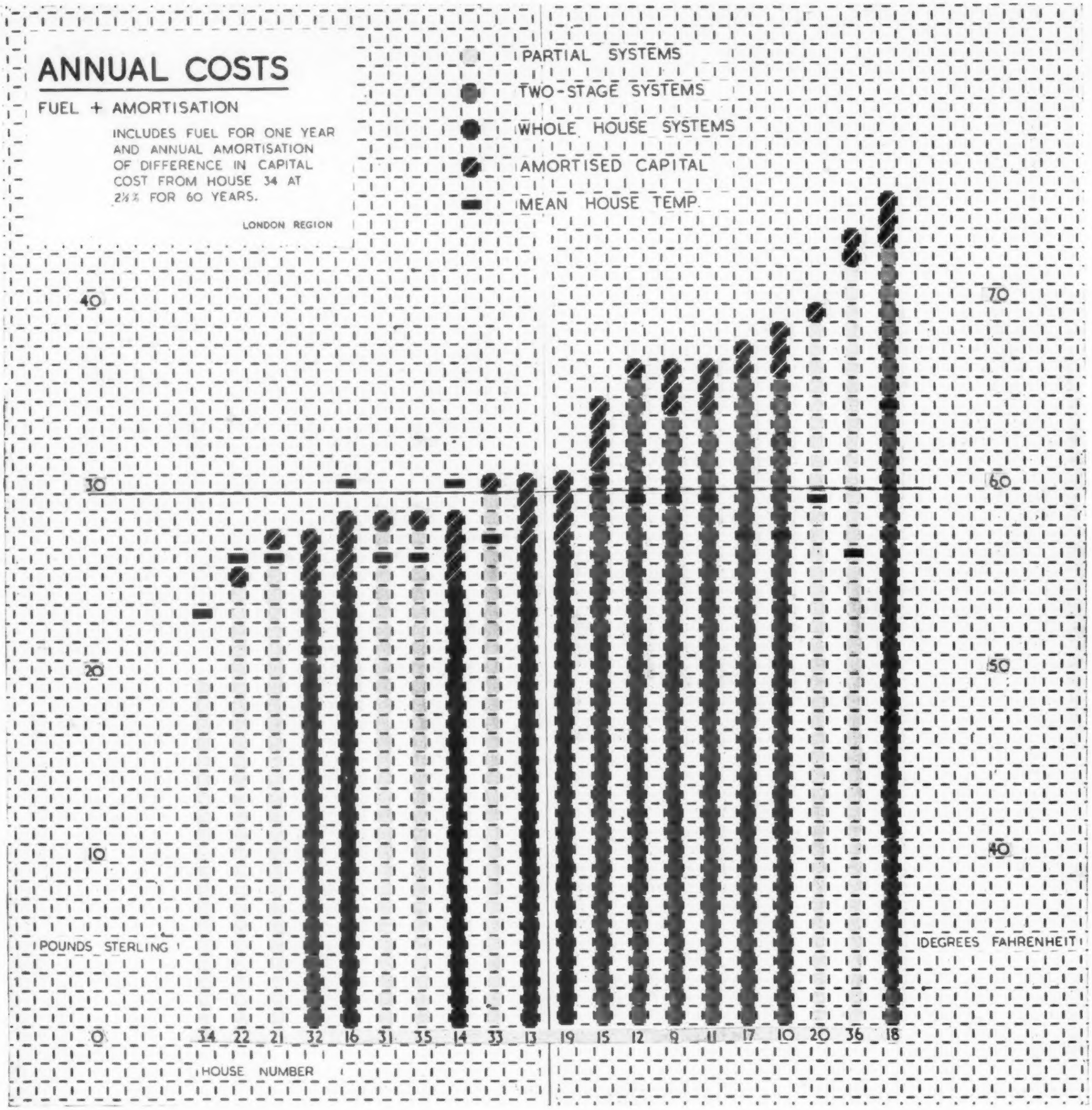


Fig. 7: Annual costs, fuel plus amortised capital; L.A. terms

could be added, one for maintenance and repairs, and a second for the amortising of the capital costs required to cover builders' profits and overheads—omitted from the cost appraisals. Reliable data on neither of these is obtainable, and they are therefore ignored. In time some indications will be obtained from the experimental houses of differences in maintenance cost. The amount attributable to the costs of better heating for builders' profit and overhead will form some percentage of the differences in capital cost, the largest of which is £124. On the basis of the local authority loan this will be some percentage of £4 a year, and for the private enterprise rate a percentage of £9 a year, but it will not be a substantial amount.

The addition of the annual sum required to amortise the excess does not alter the broad picture obtained by considering the fuel costs only. The 'Partial' houses remain the cheapest, and the 'Two-Stage' houses the most expensive, with the 'Whole House' heating group in the middle, under either conditions of loan. Amortising the extra costs of improved heating is shown to be but a small proportion of the annual running cost and allows the systems most expensive to install to keep their place toward the middle range of annual costs gained initially by low fuel consumption.

The work involved in operating the appliances cannot be turned into a money factor because housewives are not paid hourly wage rates. All that can be done is to assess the work content, and these are shown in minutes per week in Fig. 9. The figures here are measurements made on the laboratory assistants for the time they spent

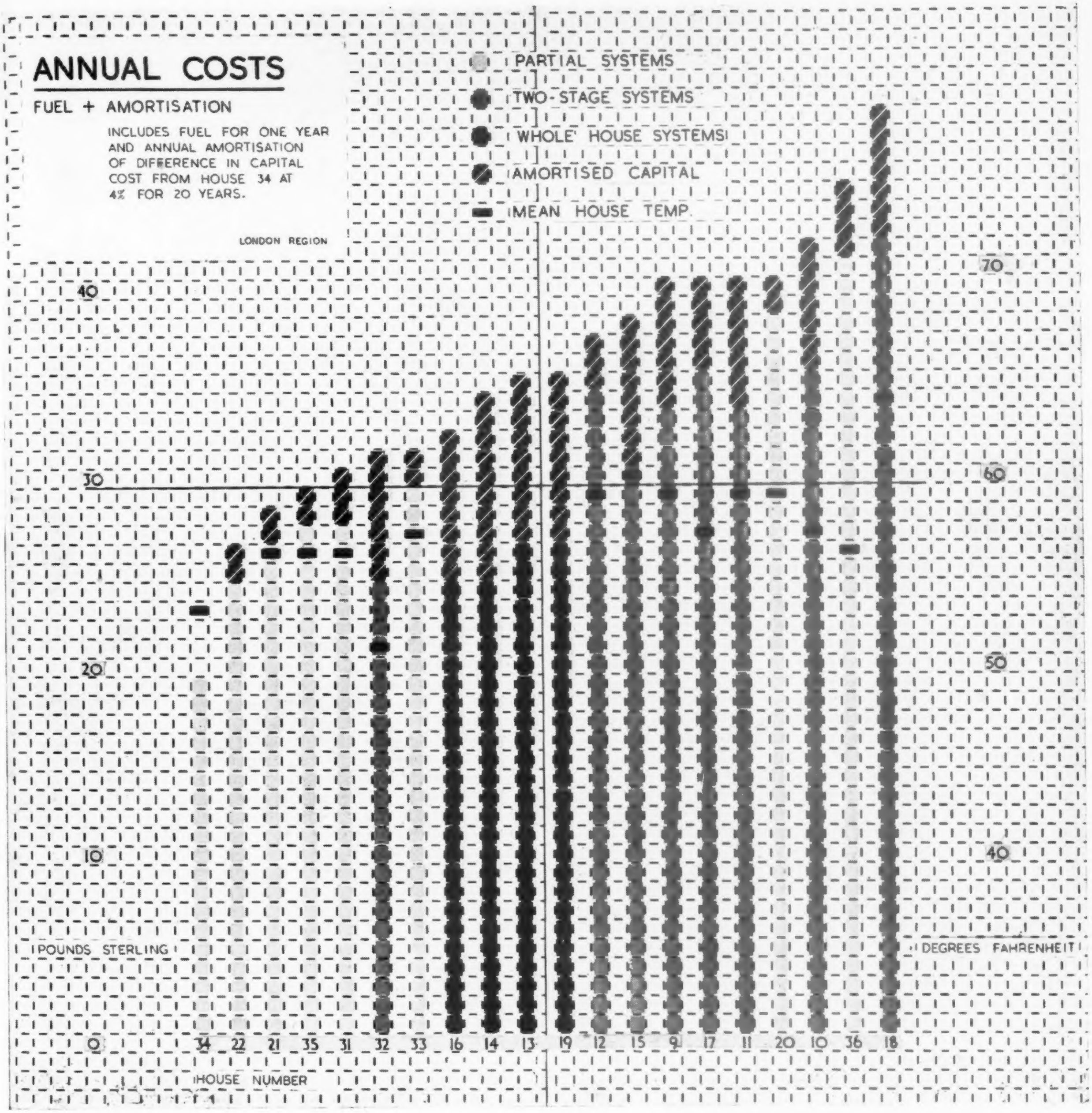


Fig. 8: Annual costs, fuel plus amortised capital; building society terms

tending the appliances, including bringing 15 lb. of coal at a time from the fuel store to the solid fuel appliances and clearing out ash and depositing it in the dust bins, but not any other cleaning. The time for tending cookers does not include any time for cooking but only tending the fires, and for gas and electric cookers is purely a nominal figure. Here the advantages of central heating with modern anthracite burning boilers can be clearly seen.

Discussion

In considering the results, too much emphasis should not be placed upon differences of a pound in cost, or a degree in mean house temperature; it is the broader distinctions that count. Further, the costs are restricted, for the present, to the London Region. Architects desiring to extend the data to regions further afield must supplement it with their own judgment, which will also be called into play when considering different types and sizes of houses or construction. In spite of these surrounding conditions, one point emerges clearly. The burden of the difference in capital cost between the cheapest and the most expensive heating system is not a serious item in the annual budget, and in colder areas will be even less important. The data serve as a reminder of the advantages of cheap building money, the extra annual cost of paying off the difference between systems being just about doubled by the terms of the more onerous loan.

The results on ventilation may be applied to other regions besides the Greater London area, but judgment must be used

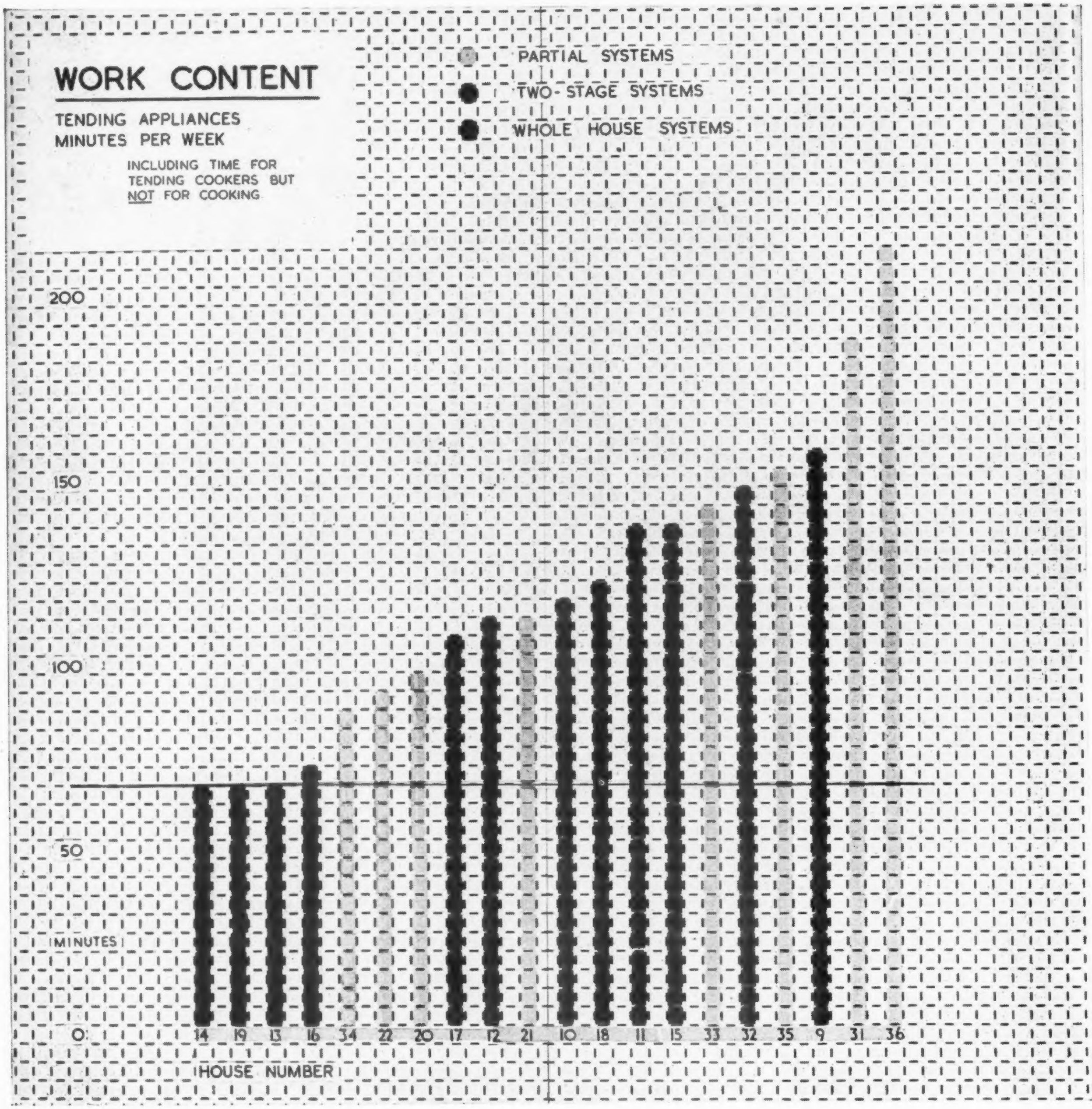


Fig. 9: Work content in tending appliances

in extending them to other types of buildings and to sites with greater density of land use. They confirm the more general statement of the Egerton Committee that 'with a door or window open very high rates of ventilation can be obtained' and that 'there is no necessity to keep windows wide open for long periods; in fact this practice leads to a waste of fuel in warming unnecessarily large quantities of air and in cooling down the structure which has subsequently to be re-warmed' (para 8.2).

It has been shown that after weather stripping, the average exchange of air between the experimental houses and outside was between 2.0 and 2.5 per hour, which is about one air change above the recommended minimum standards which are equivalent for these houses to 1.2 air changes per hour. The minimum air changes measured for wind speeds of five miles per hour are still above the requirements. The Committee do not give the lowest wind speed to which the rates required apply. If the inhabitant of a house may be relied on to open windows to supplement the ventilation, at wind speeds below five miles an hour, the amount of air permitted to enter the house may be cut down considerably. It is suggested that this be achieved by reducing the window opening—but not necessarily the area of window that opens—and by weather stripping the exterior doors. The air inlet beside the front door may not be necessary, but for the present it is suggested it be retained; further tests are required before it can be ascertained if closure of this vent reduces the air change below the recommended figure. The cost of an average

Key to House Types

9, A Two-stage: closeable fire with convected warm air (with electricity). 10, A Two-stage: closeable fire with convected warm air (with gas). 11, A Two-stage: gas heating with solid fuel domestic boiler. 12, A Two-stage: electric heating with solid fuel domestic boiler. 13, A Whole House: central heating. 14, A Whole House: central heating. 15, A Two-stage: background central heating. 16, A Whole House: central heating with interior rads. 17, A Two-stage: openable stove with convected warm air (with electricity). 18, A Two-stage: openable stove with convected warm air (with electricity and s.f. cooker). 19, A Whole House: warm air panels. 20, A Partial: open coke fire with solid fuel cooker. 21, A Partial: closeable fire with back boiler. 22, A Partial: openable stove with back boiler. 31, B Partial: back-to-back range. 32, B Two-stage: heat service unit (prefabricated). 33, A Partial: open fire with domestic boiler. 34, A Partial: open fire with back boiler. 35, B Partial: oven over fire with back boiler. 36, B Partial: combination grate with back boiler.

increase of one air change per hour over a year on the basis of the prices quoted for the London Region and the temperatures maintained during the experiment are £2 15*s*. a year for a 'Partial' House (33), £2 19*s*. a year for a 'Wholly-heated' House (13), and £4 0*s*. a year for a 'Two-Stage' House (10). As an open window even at low wind speeds increases the rate of ventilation to five air changes or more per hour—often as high as ten and even higher, it will be realized that the cost of unnecessary fresh air is considerable, though, of course, at such high rates it would be difficult to maintain the same internal temperatures.

The results demonstrate quite clearly that in selecting heating systems, the choice on economic grounds lies in most cases between the partial type of heating with the living room only warmed and full central heating with warmth in every room; background heating with topping up is likely also to be economical when both water heating and space heating are provided by the same appliance. Unfortunately the houses incorporating this concept, except 15 and 32, had separate appliances for the two functions, and they owe their unfavourable position primarily to this. The figures quoted apply to the London Region, but the comparison is valid over a wider region and in colder areas where consumption will increase in a greater degree than costs of installation, the case in favour of the more efficient appliances will be greater. Implicit in the choice between open fires and central heating is the factor of personal taste. This was assessed in the heating of dwellings inquiry published as Appendix 1 to the Egerton Report. To the question 'Would you like central heating in all your rooms and constant hot water in the kitchen and bathroom?' 75 per cent of the people said 'yes' and 25 per cent said 'no'. To the further question, 'Would you still like central heating in your sitting room and constant hot water in the kitchen and the bathroom, if there were no coal fireplace in your living room?' 45 per cent said 'yes' and 55 per cent said 'no'. The inquiry was made in 1942, and then 15 per cent said they would pay up to £7.5 a year more for this service, 19 per cent between £5 and £7.5 a year more, 14 per cent wanted the service for nothing, and one-third of the sample did not know what they would be willing to pay. The value of the pound has dropped in the intervening years, and the slow burning boiler has been developed in the meantime. An inquiry today on the same basis would prove very interesting.

In the 'Partial' group House 34 is the cheapest to heat, but it provides the second poorest space heating. Slightly improved heating is to be had from the openable stove with back boiler in the living room (House 22) or with a little extra cost with the closeable fire with back boiler as in House 21. House 21 is the only house with alternative methods of water heating for summer, and the slight extra capital cost is due to this; if the extra cost of the summer water heating appliance is ignored Houses 21 and 22 may be regarded as substantially the same in capital cost. The kitchens of these three houses are only heated by the wild heat from the cooker, and this will not suffice in cold weather. For example, in a week when the mean outside temperature was 30.6 degrees F. the kitchen temperatures were 55 degrees F. for House 21, 55 degrees F. for House 22, and 50 degrees F. for House 34. To add another solid fuel appliance for cooking or hot water as in Houses 20, 33, 35 and 36 increases the annual costs of heating and cooking up to those for whole house heating, and in some cases as in Houses 20 and 36 to an even greater amount without getting as efficient a heat service; moreover, the bedrooms are still unheated. Whether these conditions of living are really acceptable remains an open matter.

The centrally heated houses owe much of their advantage to the use of highly efficient modern anthracite burning boilers. Anthracite is not a fuel that is widely available, and the special sizing required for these boilers adds to the difficulty. Since this experiment was designed several new appliances of a similar type have come on the market—all with efficiencies in the order of 70 per cent at a wide range of burning rates, and some of these burn a greater variety of fuels. House 15 gives some idea of the position of a house heated by radiators with a less efficient boiler burning anthracite french nuts. This is shown as about £5 more expensive to run; of this about £1 is attributable to the fuel for topping up by electricity and £4 to the difference of efficiencies between the two boilers. Central heating with modern boilers is economical indeed and gives a good heat service.

Save for two very costly 'Partial' schemes the 'Two-Stage' proposals are the most expensive, but for House 32, which is the only one cheaper than the central-heated houses. However, it did not succeed in giving the heat service of the cheapest 'Partial' House; the mean house temperature is 51.2 degrees F. for House 32 as against 52.9 degrees F. for House 34. The other 'Two-Stage' houses all give heat service comparable to that offered by the centrally heated houses, but all at greater cost. All the 'Two-Stage' houses except 15 and 32 are penalized by having to supply domestic hot water from a separate appliance—burning either electricity, gas or solid fuel. The requisite 250 gallons at 140 degrees F. cost with any of these fuels something between £12 and £15 a year. The cost of hot water alone cannot be obtained when the appliance has a dual purpose, but by comparing House 34 (open fire with back boiler) and House 33 (open fire and separate solid fuel boiler in the kitchen supplying hot water only) the difference is found to be £10 per annum, which is the saving effected by using a back boiler. The more efficient appliances with lower slumbering rates will probably effect even greater savings for domestic hot water. Instantaneous heaters were not included in the trials.

While it is obvious that in a house one flue is cheaper than two flues by something around £20, it appears to need restating, and the recommendation of the Egerton Committee to install two or even three flues is hard to justify. Metal flues, when the requirements of fire protection and inspection for maintenance are met, are expensive.

When the overall efficiencies were calculated it was found that these were higher than the test-bench efficiencies for the appliances involved—for example the test-bench efficiency for the anthracite burning magazine fed boiler in Houses 13 and 14 is around 65 per cent, but the efficiency for space heating over the whole house is over 70 per cent. Similar comparisons for open fires are still under examination, but there is evidence that a substantial increase above the test bench efficiency usually quoted of 20 per cent will be achieved. This indicates that a considerable quantity of useful heat is obtained from the flue, and that in a two-storey house it is wasteful of heat to place the flue on an outer wall.

While convected warm air is used for background heating in the 'Two-Stage' Houses, and these are shown to be expensive to heat it should not be assumed that convected warm air heating is necessarily an uneconomic method. It has been pointed out that all these warm air houses are penalized by the need for separate hot water heating appliances and further expense is encountered by adding the topping up heating. A house designed to be heated partially by or wholly by a single appliance which provides both convected warm air and domestic hot water should be economical.

There have been a number of proposals of late for district heating schemes and

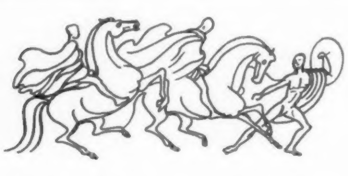
setimates have been put forward with the schemes of the amount of heat required to maintain various quantities of domestic hot water and space heating to various temperatures. These estimates are usually for the effective heat required in the house —that is the heat dissipated to the outside by conductance through the walls and by ventilation; the domestic hot water is usually included. The figures quoted in therms in Table III are for the latent heat in the fuels going into the house, including that used in cooking. The effective heat to meet the Egerton routine for domestic hot water and for space heating can be calculated for the experimental houses. Two houses are of particular interest for planners of district heating schemes, House 13 for whole house heating and House 15 for the heat required to give background heating only. Including the hot water, the required therms per annum are 710 for House 13 and 700 for House 15.

At the beginning of this paper it was pointed out that it would be restricted to the economic aspects of the results of the Unoccupied Period and that there was a considerable body of data on other subjects. In the course of the argument some of this data is touched on. Material available deals with the relative behaviour of individual appliances, the position of appliances in rooms, the comparative methods of heating domestic water, the advantages of different ducts and vents, the temperatures in lofts, larders and linen cupboards with different heating systems, detailed examination of living rooms heated by various appliances, design of flues, and, of course, a much more exhaustive examination of ventilation.

Possible modification to different combinations can be examined together with the efficiencies of the systems. Much of this material will be available in additional papers now in preparation. In the meantime the Occupied Period is in progress. From this it is hoped that much will be learnt of the behaviour of the different combinations under different loads which are placed at random by the tenants leading their normal lives.

An article of this nature is the result of many persons' efforts, and there are therefor a number of acknowledgments to be made. The work is being carried out as part of the research programme of the Building Research Board of the Department of Scientific and Industrial Research, and the paper is published by permission of the Director of Building Research. The work itself was carried out by a team with assistance from all parts of the Building Research Station. The houses were designed by Mr. C. C. Handisyde [*A*], at that time on the staff of the Building Research Station and built by the Ministry of Works. The co-operation of the Chief Scientific Adviser's Division of the Ministry of Works in costing and sociological advice as well as that of the Fuel Research Station in matters relating to fuel has been indicated in the text. Further assistance has been received from electricity and gas organizations, notably the British Electrical Development Association and the Gas Light and Coke Co., Watson House, and also from the manufacturers of appliances used in the trials.

This article will be discussed at the Architectural Science Board's lecture meeting on 7 *December* 1948, *when a film made by the Crown Film Unit, entitled 'Heating Research in Houses' will be shown; the film explains the objects of the experiment and shows the methods used. Following the film Mr. Eve will give a paper elaborating this article, before the meeting is opened to discussion.*



Building Science and Teachers of Architecture

By J. Brandon-Jones, A.A.Dip. [*A*]

ON 4 and 5 October representatives from seven recognized schools of architecture in Great Britain attended a two-day course arranged by the Board of Architectural Education in co-operation with the Building Research Station and the Field Test Unit of the Ministry of Works. Members of teaching staff came from all parts of England and from north of the Border as well as from most of the London schools. The visits to Garston and to the Thatched Barn were the first moves in a campaign to spread a knowledge of the work now being done by building scientists, and to arouse greater interest among architects by bringing those responsible for architectural training into direct contact with current experimental work. As Mr. R. Fitzmaurice pointed out in his welcome to the visitors to the Field Test Unit, research is barren unless its results are brought to the notice of those who have the opportunity to apply them in practice, and one of the most important problems facing the research worker is that of arranging for the widest possible dissemination of information through industry. In the case of building research one of the most promising ways of spreading new or improved techniques is through the architect.

Unfortunately, many architects are still hardly conscious of the existence of the building scientist, and in consequence fail to take advantage of the services provided by the Building Research Station, but if full value is to be got from the scientist there must be constant give and take between Job and the Lab. It is as necessary for the research worker to keep in touch with current practice as for the practitioner to keep up with current research. Those who attended the recent course certainly learned much from the talks to which they listened and from the films and demonstrations that they saw; after this glimpse behind the scenes there is no doubt that they will look forward with the more interest to the publication of the results of the work they saw in progress.

The field covered by the two research organizations is extraordinarily wide; there is hardly a branch of building in which active investigation is not in progress, and the more or less theoretical work in the laboratories at Garston is closely linked to ordinary practice through the large scale tests at the Thatched Barn. The work is not confined to the development of the technical side of building; it is also concerned with economics. A vast amount of information is now available on comparative costs based on detailed analysis of work on full-scale building sites in various parts of the country. Apart from its value as a check on the practical value of new building methods this work may lead to important economies in traditional types of construction, of which the costs have not previously been broken down and analysed in detail. Among the more sensational exhibits the manufacture of pre-stressed concrete components for small house flooring took pride of place, and we take off our hats to the lecturer, who made us all feel that it was just too simple; and to the demonstrator, who left us persuaded that the manufacture of pre-stressed beams was a spare time job that any intelligent architect could undertake for himself in his own back yard—all you need is a small jack and a coil of piano wire! We shall certainly watch for the full scale adoption of these beams in forthcoming housing programmes.

Apart from the value of the course itself it was extremely interesting to have the opportunity of meeting one's opposite numbers from other schools and to discuss over lunch and in the bus some of our common teaching problems. Such opportunities have been far too rare, and it is to be hoped that this course will be the first of many. Is it out of place to suggest that these gatherings should not be confined to the technical side and that lecturers on Design and History should be given a chance to meet on courses of the same type? Could we not, for example, have a similar show put on by arrangement with the Warburg Institute, and the authorities in charge of some of our museums and art galleries?

Recent Developments in the Precasting and Prestressing of Concrete

By L. W. Elliott, A.M.I.C.E., A.M.Struct.E. [*A*]

Read at a Meeting of the R.I.B.A. Architectural Science Board on 26 October 1948. M. Hartland Thomas [*F*] in the Chair

THE TITLE of this paper is, to a certain extent, misleading as I propose dealing with the subject of *prestressing* concrete and not precasting of normal reinforced concrete, although the precasting techniques which have been developed in recent years for the rapid curing and consolidation of concrete are even more important for the production of prestressed concrete. There has been so much development in the field of prestressed concrete within the last decade that it is necessary to devote the whole paper to it in order to do justice to the subject.

Historical and Theoretical Developments

Prestressing means that by suitable methods stresses are created in a structure before it is loaded and are artificially imparted so as partially or wholly to counteract those occurring in a structure under loading conditions. Any material can be prestressed but it is especially suitable for materials of unequal strength in tension and compression. Concrete is one example of such a material. Prestressing has and is being applied daily in a great number of human activities, and perhaps a simple example of a number of books held together between the hands will show that the books would collapse if insufficient force is exerted to enable the tensile stress at the bottom to reach zero under the weight of the books. In a normal reinforced concrete structure the bending produced by loads is resisted, partly by the steel and partly by the concrete. The two materials do not act homogeneously, in fact, the design of normal reinforced concrete work is not honest as a number of assumptions are made which are not strictly correct. This is how it is normally done.

The concrete, which is a very good material for resisting compressive loads, is a very poor one in resisting tensile loads, although it does resist tensile loads to a varying degree, depending on the mix of concrete used. In normal reinforced concrete design the tensile resistance of the concrete is entirely neglected because there are three stages in the structural utilization of normal reinforced concrete in bonding. Firstly, there is an elastic stage where the material behaves homogeneously and tension is produced in the concrete. As the tensile resistance of concrete is only 1/10th to 1/15th of the compression resistance, this first stage is of very short duration, and the concrete yields and starts cracking when the elongation is between .01 and .02 per cent. In the second stage, which we might call the plastic stage, the concrete in tension has a plastic movement of very short duration, resulting in hair cracks when the elongation reaches .03 per cent. The last and most important stage is when the whole tension is taken by the steel reinforcement and therefore, in concrete design, we normally ignore the first two stages and design on the last stage.

A limiting factor therefore in normal design is the formation of hair cracks, which always develop although they are not always seen. The widening of the hair cracks increases until the stress in the steel reinforcement is, in the case of mild steel, 18,000 lb/sq. in. Whilst cracks up to 1/40th of an inch are harmless, cracks above this dimension cause trouble with fumes and water. The use of a high-tensile steel cannot greatly improve the position because the elongation of the steel further increases the cracking in the concrete and may destroy the bond. It is for this reason that the stress, even in the case of high-tensile steel, is limited to 25,000 to 30,000 lb/sq. in., whereas the steel is capable of taking a much larger stress. The principal reason then for prestressing concrete is to prevent these hair cracks and to continue the first stage by making the concrete section homogeneous.

Concrete is, therefore, especially suitable for prestressing, especially when its characteristic features are considered. It is able to take compressive stress, but its resistance to shear and tensile stress is not high enough to compete with the compressive stress and requires special shear and tension reinforcement. Furthermore, with precast concrete elements, excessive cracking may occur if they are strained whilst being transported to a building site contrary to the conditions intended. This is due to the limited resilience of ordinary reinforced concrete, as considerable permanent deformation occurs under excessive load conditions. Thus sometimes in an emergency when a reinforced concrete structure is stressed in excess of its working load, permanent deformation of such magnitude may occur that the structure becomes unfit for further use.

I have mentioned these points to show that the properties of concrete could be greatly improved by prestressing, which can be carried out by a number of methods, with two principal methods, namely, pretensioning and post-tensioning.

In the case of pretensioning the reinforcement is tensioned and consequently stretched by suitable jacking devices and held until the concrete is introduced to surround the wires. After the concrete has attained sufficient strength the wires are released and attempt to return to their original length, thus transferring the load contained in them to the surrounding concrete. The wires are held by special end plates or simply by the change of shape occurring in the wire, as when the wire is stretched its cross sectional area is reduced and the concrete surrounds it and by shrinkage bonds itself to the wire. When the wires are released they attempt to return to their original shape, but this can only occur at the ends, thus making a conical wedge. Post-tensioning is carried out by loading the wires against the hardened concrete elements. These wires are either contained within, or externally to, the hardened concrete.

From the early days of reinforced concrete, prestressing has been employed, although with little success until recent years. The first mention of prestressing was in 1886 when P. H. Jackson of San Francisco described methods for stretching ties provided in the footings of arches by turn buckles, screws and nuts. Two years later a German patent was applied for relating to a fire-resisting protection for timber floors composed of short members of triangular section mortar with tension wires. But the idea of counteracting loading conditions was for the first time expressed by the Austrian, J. Mandl, who, in 1896, wished to utilize the maximum strength of concrete by reducing tensile stresses. In the same year a Norwegian, J. Lund, suggested the production of what can be considered the first prestressed floor. This floor consisted of applying blocks jointed in mortar with prestressed tie rods arranged in a wide mortar joint.

Shortly after this, in 1908, an American, G. R. Steiner, proposed tightening reinforcing rods first against the green concrete to destroy the bond and then to increase the tension after the concrete had hardened. These last two examples represent the first steps towards effective post-tensioning. In all these cases, however, losses occurred owing to shrinkage and creep, and it can be safely assumed that the initial prestress did not exceed that required to counteract the effects of shrinkage, and the results were therefore unsatisfactory.

Probably the first real advance towards a solution was made as a result of attempts to guarantee absence of cracks in normal reinforced concrete, especially in hydraulic structures such as pipes and tanks. R. H. Dill, of the United States, appears to have been the first in 1923 to propose that this should be carried out by the following system: the bond between the concrete and reinforcement is destroyed or prevented by coating reinforcement with a plastic substance, the stretching process being carried out after the greater part of the shrinkage had taken place. Thus avoidance of loss of prestress due to shrinkage was a step in the right direction, and various other people adopted this method for constructing circular tanks.

The name of the person to whom chief credit must go for prestressed concrete is Monsieur Freyssinet who, in 1928, used a very high-strength steel, allowing a higher measure of pre-tensioning to enable a substantial portion of stress to be made available, after shrinkage, to exert permanent compression on the concrete section. Freyssinet's ideas were further developed in Germany by Hoyer who, in 1938, introduced a super high-strength piano wire and suggested the manufacture of units in a continuous run, thus avoiding a large number of jacking devices. Development, up to now, has been to a certain extent restricted because of the patent position, but the patent relating to the principle of prestressing concrete by pre- and post-tensioning has now lapsed in this country and the current patents only apply to methods of application. The post-tensioning patent is still operative on the Continent.

I should like now to explain the present-day basis of design in prestress concrete. Firstly, it is important to use the highest possible quality steel, with an ultimate tensile stress of between 100/120 tons/sq. in. Secondly, the concrete must be high grade with an average cube strength at 28 days of 9,000 lb. These high strengths are necessary to overcome the following losses: firstly, the elastic shortening of the concrete; secondly, the shrinkage; and thirdly, creep. In design these factors are normally accounted for by stressing the steel initially up to three-quarters of its ultimate tensile strength but only allowing two-thirds of the ultimate tensile as available for design purposes.

The following diagram (note—here a slide was shown) shows the comparison between various structural elements. In the case of the steel beam, the weight is 46 lb. per ft. In the second case, the prestressed concrete beam weighs 90 lb/ft. with a steel weight of only 3.2 lb. The stress diagrams show how the stresses are accounted for. It will be observed in this case that a certain amount of tensile resistance on the part of the concrete is permitted. The third beam is fully prestressed and weighs 120 lb/ft. with a steel weight of 3 lb. In this case no tensile stress is imposed upon the concrete. The last case, of course, shows a steel beam as normally employed with a concrete casing with a total weight of 210 lb/ft. What is not shown is a normal reinforced concrete beam, which would use 15 lb. of steel per ft. and weigh 300 lb. with a depth of 24 in. The thin webs in these beams are possible because with prestressing the concrete's resistance to shear is considerably increased. Similar cases are shown for the small type of prestressed concrete joists suitable for housing compared with normal reinforced concrete. From the point of view of calculation, once the losses have been assessed by research the calculations are more direct and simple than with normal concrete design.

Research in this country and abroad

Considerable research has been carried out in this country and abroad in order to arrive at some directives concerning the design of prestressed concrete. Germany, before the war, faced with necessary economy of steel, devoted considerable energy to research in order to establish the best design and production methods and to assess and minimize the losses, such as elasticity, creep, shrinkage. Attempts were also made to investigate the fire-resistance and the desirable factors of safety, both statically and for fatigue and a draft code of practice was prepared. During the war most European countries, under the influence of Germany and with sparse steel supplies, were compelled to carry on a considerable amount of prestressed concrete work. Probably the most objective research carried out was done in Switzerland during 1941/5, and a number of conclusions were reached concerning the quality of the wire and the concrete.

It was found that, for a given type of wire, the anchoring in the concrete will be better the smaller the diameter, the higher the initial stressing, and the greater the compression strength of the concrete at the moment when the stress is released. The static loading tests carried out showed that, within the range of the working load, the beams behaved as if they were perfectly elastic. It was also found that prestressed concrete withstands fatigue in a remarkable manner and that, even in the case of fatigue stressing, the concrete possessed a bending tensile strength and tensile strength. The research furnished the basis on which methods of calculation should be made and specified the minimum cube compressive strengths for concrete and a water cement ratio of a minimum of 0.35, consolidated by means of high-frequency vibrations with a frequency of 6,000 per minute.

For self-bonding steel wires, the following requirements were laid down. Steel wires with smooth surfaces, a maximum diameter of 2 mm. For wires with rolled notches, a maximum permissible diameter of 6 mm. Twisted steel wires composed of 3/6 wires, a maximum permissible diameter of 3 mm. for each separate wire. It was also laid down that the following factors of safety should be adhered to: for static stressing, crack formation 1.5, rupture 2.5. With fatigue, crack formation 1.2, rupture 1.5. It will thus be seen that, as far as prestressing is concerned, as soon as cracks are formed the tensile stress of the concrete has been exceeded and the beam then goes on to fail in the same way as normal reinforced concrete.

The Swiss Government accept prestressed designs complying with their recommendations and in Sweden, too, standards have been laid down. It is now understood that in this country a draft Code of Practice has been submitted to the British Standards Institution for their consideration. The Ministry of Works are doing a certain amount of research into prestressed concrete and have promoted investigations into Continental developments. The question of steel economy naturally makes prestressing attractive these days and we have now had the benefit of practical application in Germany, Sweden, France and Belgium on a large scale.

The Method of Prestressing

I shall now briefly describe the principal methods by which prestressing is carried out. Firstly, the methods of Monsieur Freyssinet in France. Freyssinet employs both methods of prestressing, namely, pre-tensioning and post-tensioning. In the case of pretensioning, for small units, he usually stresses against the mould of the unit, and by providing separate anchorages in the units. Perhaps the most interesting application by Freyssinet is in the field of post-tensioning by means of a double-acting jack, the reaction of the prestress being taken by the concrete member. This system, in common with all post-tensioning systems, has the advantage that a certain amount of shrinkage which occurs in the concrete has already occurred before the stress is applied. Freyssinet uses a cable which is cast in with the concrete, but is prevented from bonding by means of either a thin metal sheathing or by the use of tarred paper. At the ends of each cable are anchorage cones made of concrete and reinforced with wire wound into a spiral. The cable itself is composed of 12 or 18/5 mm. diameter wires, placed round a central spiral core of wire. The wires protrude from the end of the cone and are wedged to the double-acting jack. The jack, which is worked by a small hydraulic pump, tensions the wires as the first step, but when the desired degree of tensioning has been achieved the second part of the jack forces in a male tapering cone between the wires and into the cast-in female cone. A hole is left in this cone to enable grout to be pumped into the wires to prevent corrosion.

In the case of Professor Magnel's system of post-stressing, the wires are wedged to steel plates, which are assembled one on top of the other and are generally referred to as sandwich plates. The wires are placed separately within the concrete member and occupy a considerably larger area of cross section, as opposed to the Freyssinet method. This increase of area is naturally lost to the resistance of the member. The wires are only pre-tensioned two at a time, as opposed to the wires in the Freyssinet cable which are stressed simultaneously. There have been criticisms made to the effect that in prestressing the wires simultaneously there might be some difference in tension in individual wires, but in the Magnel system this does not occur as the wires are stressed in pairs. On the other hand, the Magnel sandwich plates which are cast into the concrete use a considerable amount of steel, thus detracting from the steel-saving value of prestressed concrete, although, perhaps, there is no steel shortage in Belgium.

The other method of prestressing is that of Hoyer in Germany, who obtained a patent separately from Monsieur Freyssinet, but by his patent he was limited to using wires of a maximum diameter of 2.5 mm. The Hoyer method was to use a long bed for pre-tensioning and he relied entirely on the bond between the wire and the concrete for transferring the stress to the concrete. His method was a very practical one and enabled prestressing on a large scale to become possible. Naturally, a number of methods varying slightly from those of Freyssinet and Hoyer have been

developed, but time does not permit of a complete description.

The Types of Structures suitable for Prestressing

I should like now to describe the broad types of structures for which prestressed concrete has been used.

Firstly, because concrete when prestressed is free of cracks, structures where it is important to prevent the egress of water are very much better designed in prestressed concrete. Examples of such structures are dams and pressure conduits for the delivery of water to turbines. Freyssinet in North Africa some years ago erected a dam where the reinforcement was prestressed. Other structures of this type are storage tanks, silos, reservoirs and water towers. There has recently been erected a large reservoir in France for two and a-half million gallons of water. When using normal reinforced concrete these tank types of structures are generally designed on the tensile load-carrying capacity of the reinforcement, as naturally, in view of the elongation of the reinforcement, no concrete tensile stress is permissible and the stress figure for reinforcement is therefore limited in order to prevent serious elongation. Even so, cracks do appear and in many cases extensive waterproofing has to be carried out. The obvious solution is for the concrete to be made capable of carrying the tensile stress by means of prestressing.

Other examples of structures where water is a serious inconvenience are harbour works, especially jetties subject to impact by vessels. In the case of normal reinforced concrete, permanent deformation would enable salt water to corrode the reinforcement. The erosive action of the sea, due to the impact of waves, can in a similar manner sometimes limit the use of normal reinforced concrete for coastal defence. Prestressed concrete would be very useful for this branch of civil engineering.

Naturally, all types of pipework used for sewers and water supply are greatly improved by the use of prestressed concrete. Monsieur Freyssinet has evolved an elaborate system of factory production for pipes where it is possible to manufacture a complete pipe, cured in two hours, although this factory is not producing at the moment.

Secondly, prestressed concrete, in view of its resistance to fatigue in reversals of stress, is eminently suitable for such elements as railway sleepers and towers for transmission lines. During the war, owing to the reduced supplies of timber, it was necessary to seek an alternative material for railway sleepers. Normally, concrete would have been impossible because of the rigorous loading conditions. An experimental plant was set up at Coleville, and in view of its success a large-scale plant was later erected at Tallington.

Transmission lines create reversed loading conditions in the towers owing to the wind forces and possible fracture of cables, and the usual material for the posts or towers has, in the past, been steel. Here again, prestressed concrete has produced an alternative with a considerable saving of

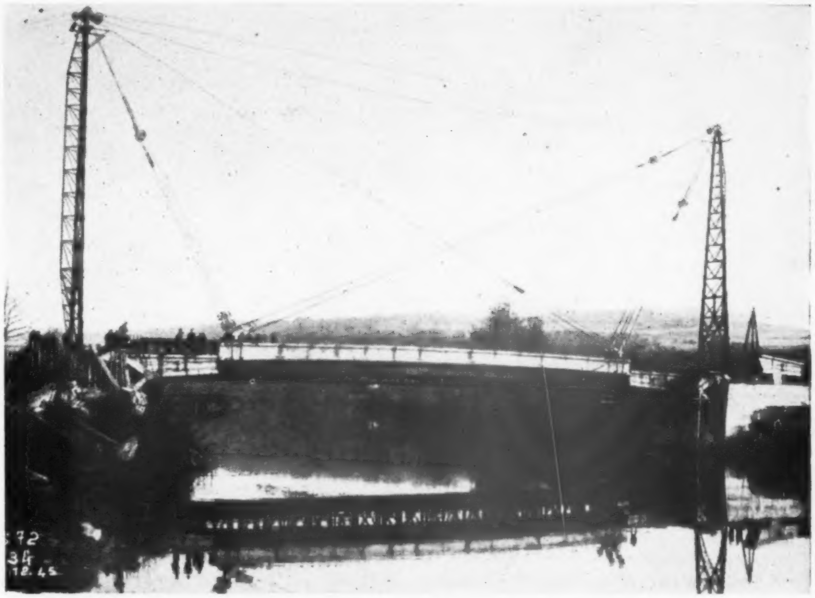


Fig. 1: Bridge at Luzancy, France, in course of erection

steel. Other structures normally precast and subjected to reversals of stress are piles and large-scale precast elements of a size where serious stresses are caused due to transport and handling. As piles are normally subjected to a compressive load, it would appear uneconomical to prestress them, but it is usually necessary to increase the steel content to cope with the impact caused by driving and the reversals of stress due to handling. By prestressing, much smaller breakage losses occur.

In Sweden at a factory visited personally, I saw the production and subsequent erection of factory girders. The large precast elements where transport and handling are serious factors, are girders for factories up to say 75 ft. long. In this case the cost was less than normal concrete due to the reduced transport.

It is possible in these long-span structures to design to a depth-span ration of 1:18, as compared with a normal ratio of 1:10 up to 1:15 in the case of structural steel. This is a remarkable achievement and shows that in these cases prestressed concrete is not only a substitute, but a better solution. Normal reinforced concrete has not been able to compete with steel up to now in this field, and this development is therefore of great interest, as lower maintenance and greater head room would show considerable economical savings as compared with the traditional structure.

Descriptions of Structures using Prestressing

In France there is a very fine example of a bridge using post-tensioned concrete. The units for this bridge were precast and site-assembled by means of cables run in grooves and tensioned with the Freyssinet double-acting jack. The whole bridge was assembled as three structural units, two end cantilever elements and a central beam. Figs. 1 and 2. An interesting point in the design is that the reinforcement was graded to give a greater weight of steel in the centre portion by means of the cables being returned within the flange to the anchoring cones for prestressing. The joints were made with a stiff, dry cement mortar. This bridge has a particularly low ratio of span to depth, and this type of flat arch is only possible by the use of prestressed construction. The savings by factory precasting and the avoidance of shuttering enabled the bridge to be built at an economic cost with a very high standard of finish. Up to 400 similar bridges are now being built in France with spans up to 220 ft. with a maximum thickness at the crown of 2 ft. 10 in.

The bridge was designed by Monsieur Freyssinet who claims that he designs æsthetically, without calculation and with approximate dimensions. It is then sent to the design office, where the detailed engineering calculations are made, and it is claimed that the design rarely differs from the original dimensions produced. In this country a bridge has been erected in Lincolnshire using the Freyssinet methods.

In India the main hangar for the civil airport of Karachi consists of a prestressed reinforced concrete roof. The internal dimensions are 900 ft. × 130 ft. The roof spans the 130 ft. dimension and is carried on two independent prestressed reinforced concrete beams, each of 200 ft. span. Each arch shell is $2\frac{1}{4}$ in. thick, spanning 35 ft. and stiffened at the edges with deep prestressed concrete ribs. The shell and ribs act together.

The stressing is carried out by the Freyssinet methods with cables enclosed in a sheath to prevent bond. This hangar was designed in prestressed concrete because of the extreme shortage of steel in India during

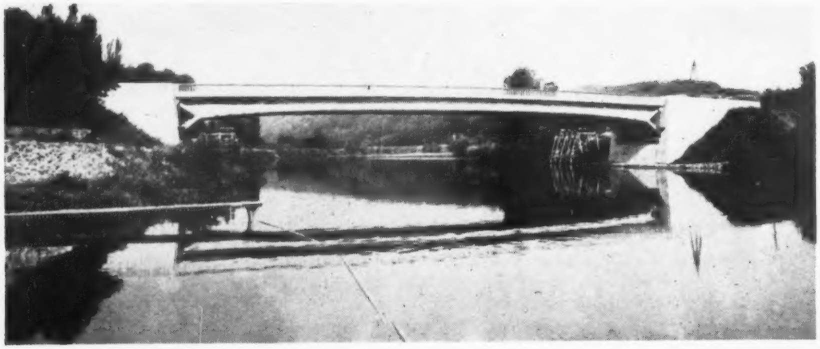


Fig. 2: The bridge at Luzancy, completed

the war. It has been so successful that a further programme of hangars has been decided upon at Bombay, Delhi and Calcutta. I should like to add that the designs of this hangar and the bridge in Lincolnshire were prepared by the Prestressed Concrete Company, London, on the Freyssinet patents.

In Belgium two very interesting hangars have been built, using the post-stressing methods of Professor Magnel. The roofs of the hangars are made in hollow concrete slabs, 23 ft. long by 3 ft. by 10 in. thick, supported by hollow concrete beams, spanning 170 ft. The post-stressing is obtained by 424 wires of 0.27 in. diameter, giving a total tensile force of 1,400 tons. These beams are precast on the ground and then erected by being jacked up the full height of the supporting columns. It is understood that this method of construction was adopted purely on price, as compared with competitive structural steel schemes. There is a reduced depth of the girders as compared with most other constructions. Fig. 3.

Whilst we are on the subjects of airports, an experimental airstrip in prestressed concrete has been laid on at Orly Airfield in France, designed to cope with the excessive impact loads from the landing of large aircraft. The present practice of building thicker and thicker airstrips, which in some cases are already 21 in. thick, cannot go on, and it is hoped that the use of prestressed concrete will be successful in order to effect considerable savings of material. Similar experiments are being carried out in this country.

Owing to the saving of steel and concrete, use of prestressed concrete is to be urged forward, owing to the present difficult supply position regarding steel and timber. In the case of a 1,000 sq. ft. area house, the first floor normally uses over one-third of a standard of timber, and it would be reasonable to assume that if concrete could be substituted for the timber first floor of a house our timber supplies could be stretched still further, enabling more houses to be built. Obviously, it would not be feasible to provide normal concrete flooring as, apart from the weight, some 2 cwt. of scarce reinforcing steel would be used, and it would therefore be pointless to save timber at the expense of steel. If the floor were to be made of prestressed slabs or joists, it is quite possible to provide a greatly improved floor with only about 35 lb. of steel.

A great deal of experimental work has been going on in this country and the stage has now been reached where it is hoped that it will be possible to use prestressed concrete joists for a large number of houses next year. On the Continent the production of these small joists, together with a flooring slab known as the Schaefer slab, are produced on mass-production lines. The Schaefer slab is extremely interesting, being a sandwich flooring composed of dense concrete skins with a centre core of lightweight concrete. The whole floor is cast in a continuous line by a machine and later cut into suitable sizes.

Another extremely interesting floor is being produced in Switzerland. It is a composite floor consisting of a factory-made element with an in-situ cast portion. Fig. 4. The factory element consists of a plank made up of clay tiles specially moulded with grooves on the upper surface for the location of the high-tensile steel wires. The process of manufacture consists of arranging the tiles end to end in a continuous line 240 ft. long and the wires are placed in the grooves and tensioned. The grooves are then filled with mortar and after it has set the wires are released, thus prestressing the mortar and the clay tiles. This plank is then cut to lengths and used as the prestressed element of the tension zone of the floor spaced apart by means of hollow blocks. In-situ concrete is poured to form a series of tee beams, and by increasing the thickness of this concrete floors of varying spans are achieved. This is an extremely simple floor requiring the minimum of factory-made elements with a constant low steel content. The cost of a floor in Switzerland is about 22s. per yard erected. The plank can also be used as a lintel with the brickwork acting as the compressive portion of the beam.

Other types of precast elements suitable for houses have been developed. At the same factory where the Schaefer slabs are made, various types of trusses have also been produced with an extremely low steel content. Whereas in most prestressed concrete designs only members subjected to compression and tensile stresses at the same time are prestressed, to eliminate the tensile stresses, in this case the prestressing is con-

Fig. 3: Aircraft hangar near Brussels

fined to the simple tension members with just sufficient initial compression put into the other members to enable the trusses to be handled with less risk of damage. In the example shown, the truss spans about 17 ft. and contains only from 4½ to 7 lb. of steel per truss. Unfortunately, I have no evidence to enable some comparison in cost to be made with the normal timber truss used for housing, although it would obviously depend on the production technique employed.

Monsieur Freyssinet in France is producing at a factory in Orleans prestressed beams suitable for housing, where the prestressing is taken by the mould. Thus, after the concrete has been cast, the whole unit can be transported to steam curing kilns after pressure has been applied to get rid of the excess water in the concrete. After a period of 2 hours it is possible to remove the element from the mould, thus ensuring the maximum production with the smallest capital. Fig. 5.

A very interesting example of the effective use of prestressed concrete can be seen in a factory for the production of river barges. This factory was set up in Paris by the Germans using the Hoyer method. In the system used the wires are prestressed in a horizontal plane and, after the concrete has set, the slabs of concrete are folded up to form the sides of the barge. After applying steel bows and stern and spraying with concrete the completed barge is launched. Prestressed concrete is extremely useful when used in this manner because barges are subjected to a large amount of impact and the remarks I made concerning harbour works are applicable.

During both wars in this country many attempts were made to construct barges and war-time vessels of normal reinforced concrete, but they were not completely successful. Obviously a better solution would have been to use prestressed concrete. During the war Germany erected a great number of heavy civil engineering structures for the protection of the civil population against

enemy action and for the protection of implements of war, such as submarines, ships and factories. Such structures were normally roofed with extremely thick reinforced concrete slabs and the major problem was to carry out this work using shuttering with the minimum interference to the area covered. The circular arc girders were of prestressed concrete and were used as permanent shuttering, and in some cases as the structural members.

An interesting example of the use of prestressing can be seen in the repair of a church tower which had fractured, due to subsidence. By the use of prestressing, the portions of wall were subjected to a compressive stress, because it was due to the inability of the walls to carry any tensile loads that the structure failed. This extremely interesting job was carried out by Dr. Abeles. Similar techniques could be employed for the protection of new buildings in areas subject to subsidence.

Conclusion

In conclusion, I should like to enumerate the following points: prestressing, without doubt, leads to very great economy in materials, especially steel, but, at the moment, this does not mean necessarily that the cost is lower than normal reinforced concrete work, because high-quality materials are necessary, together with good production control. Capital expenditure is also necessary to a varying degree, depending on the system and the production scale. Further, although the steel used is from one-third to one-fifth of the quantity normally used for reinforced concrete, the cost of this special steel is as much as four times as high as mild steel. Today, however, in view of the real need for economy of steel and concrete, the use of prestressing should be given every support. Unfortunately, although the Government is extremely aware of the economies the production of the high-quality steel is limited, so that would-be developers are warned to inquire fully into the steel position before embarking on production.

On the other hand, I think it necessary to urge the greater production of suitable steel, as in future structures I can envisage a greater use of prestressed concrete as opposed to normal concrete methods, with structures either wholly or partially prestressed. Normal concrete will, of course, always be suitable for certain parts of structures, such as foundations and axially-loaded columns. Already Dr. Mautner has designed a prestressed building frame on which tests have been carried out proving its efficiency for multi-storey structures.

With prestressed concrete, we can look forward to its use where normally reinforced concrete has not been satisfactory, such as large-span girders, bridges with little headroom, and all forms of water-bearing structures. Owing to the transport and handling position, precast concrete products will be more satisfactory designed in prestressed concrete. There exists a real need for suitable lightweight precast flooring and roofing elements using very little steel for housing and schools, and the solution might be to use prestressed concrete in conjunction with lightweight concrete.

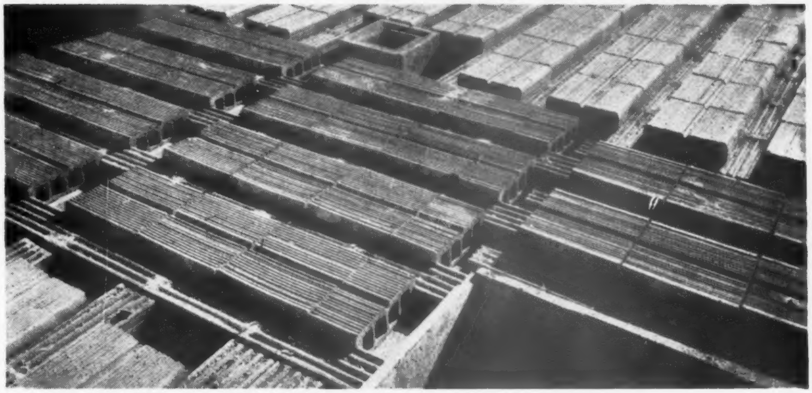


Fig. 4: The Stahlton floor, Switzerland

From the planning point of view the use of prestressed concrete will have a great effect, as a reduced number of columns will be necessary with less weight of structure due to the reduction in the size of individual members. It does appear that in the same way as welded steel construction is more economical and will gradually supersede riveted construction, prestressed concrete will supersede normal reinforced concrete to a large degree. This is all to the good because I do not feel that we can ever look forward to the time when, as before the war, steel could be used in a very wasteful manner. Even now there is evidence that outmoded methods of design and fabrication are limiting the building programme.

I have mentioned in the course of this paper several examples of prestressing where a reduction in costs over normal work has been achieved. I consider it possible to compete with all forms of reinforced concrete structures, given suitable production facilities. It is always extremely interesting to note that during the transition from one structural form to another, costs have not tended to become lower although there is usually a reduction in the amount of material used. This is clearly shown in the case of welded steel construction where, although there is a considerable saving in material, there is seldom a reduction in cost. This is a factor which should be thoroughly investigated and it might possibly be due to the fact that architects and authorities do not adopt new methods as quickly as they should because it is only by the greater use of new methods that the production costs will be brought down. I have mentioned this point in order to try and avoid the inappropriate use of prestressed concrete construction, as it has now clearly passed the experimental stage and is being produced on the Continent much more than here. The view has been expressed that it was due to the war and shortage of steel in Europe. Whilst this is true to a certain extent I must say, regretfully, that we in this country tend to hang on to old methods too long, or lack the initiative to develop new ideas.

I am sure that the Architectural Science Board of the R.I.B.A. is doing its best to bring new techniques to the fore, but we must have the utmost collaboration with the other professional institutions, especially our engineering colleagues, Government Departments and research establishments, and, naturally, the co-operation of the contractors.

Finally, I should like to express my sincere appreciation to the following persons who have assisted in the presentation of this paper, by supplying information: O. J. Masterman, of the Ministry of Works Chief Scientific Adviser's Department; Mr. Dodds and Dr. Mautner, of the Prestressed Concrete Company Limited; Dr. P. W. Abeles; Mr. A. F. Hare.

DISCUSSION

Mr. Ewing (Ministry of Works) said the Ministry's interest in prestressed concrete sprang, he thought, from three factors. The first was the obvious saving in scarce materials, particularly steel, timber and cement. Secondly, the Government believed, on advice—and this had just been largely substantiated by Mr. Elliott—that in various ways prestressed concrete was better than other building materials, particularly ordinary reinforced concrete, and for certain operations better than structural steel. Thirdly, they believed prestressed concrete should lead to savings in cost. There were already indications that pre-stressed concrete would prove to be worth while from a cost point of view in certain applications, and would help to reduce the cost of building.

As to policy, the Minister of Works was very interested personally; and here again the subject fell under three headings. First of all, research and development were being encouraged and fostered by the Ministry through the Chief Scientific Adviser, through research into and the development of methods of manufacture and technique, and through a programme to study the costs of manufacture systematically by modern statistical methods, and so on. The main research effort however must come through the Building Research Station on the one hand, with its extensive programme, and through individual manufacturers and other individual interests on the other hand. The

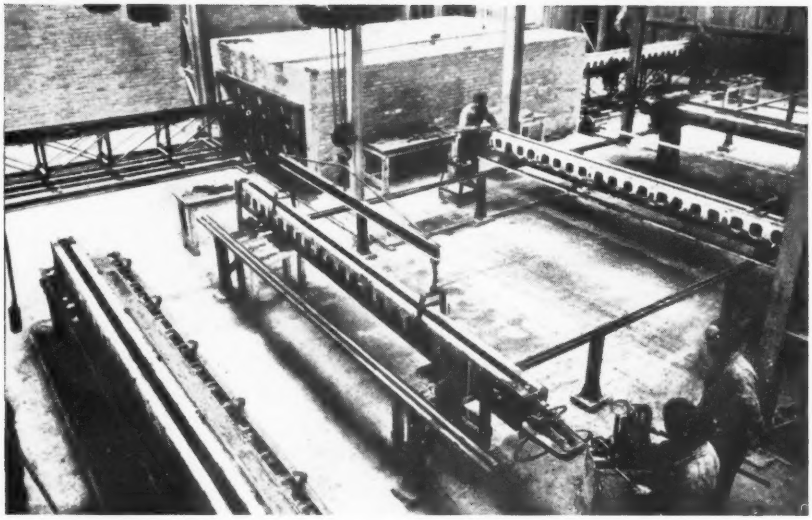


Fig. 5: Beams being cast in factory at Orleans

Ministry would do all they could, but obviously they could not carry out much research themselves. It seemed to them that the scale of the research effort in this country—although it had developed considerably in the last few years—was a good deal behind the continental effort.

Perhaps most important of all but less easy to state precisely was what was happening in large-scale engineering work. The Ministry was directly interested in all the applications described by Mr. Elliott, but in the main the work must be carried on by private firms with the Ministry's encouragement.

The Ministry was doing all it could to help—in a period where there must necessarily be controls of scarcities—by sponsoring building work, helping the manufacturers to obtain plant and equipment, coal, and so on. Above all, there was the problem of steel wire. Not only was the wire scarce but also the manufacturing capacity of certain types of wire.

Finally, although the Government could and would do a lot, in the end it was the customer who would settle the matter. The architect, if he might say so, held a strategic position there, and had a particularly important part to play on behalf of the customer.

Mr. D. Dex Harrison [*A*] said when precasting concrete for prefabrication had been studied some years ago the following words had been written down: 'Concrete lacks certain of the advantages of steel and timber for prefabrication. It is heavy and bulky in relation to its cost, and it is brittle—all factors militating against its successful transport over long distances.' So far as precast concrete went, those were the three main considerations that had to be faced. It now seemed that prestressed concrete ameliorated all three disadvantages.

There was one other defect of precast concrete he would like to hear a little more about in relation to prestressing, and that was the loss of continuity of structure. He believed the Ministry of Works had produced pieces of piano wire covered by an inch or so of concrete which had then been prestressed to produce an element that could be inserted in the member in such a way as to stick out at the end and give a little extra piece of concrete or reinforcement which could then be built in with *in situ* work and carry the prestressing through. He would like Mr. Elliott's confirmation of this.

One other difficulty was where the members were on a curve. Could wire be prestressed on a curve? He thought that if pulled out it would straighten itself.

Mr. J. S. Hartley [*A*] asked whether holes could be knocked arbitrarily in the centre of small beams suitable for use in domestic building, as with timber or the drilling of steel, for the passage of conduits.

Mr. H. L. E. Bramer (A.M.I.Struct.E.) said he had approached the problem in the first place because it seemed such an easy answer to the steel problem, which was a perpetual headache. After further investigations, which had taken him to Zurich in Switzerland to examine the Stahlton floor, the conclusion was reached that not only was there a very appreciable saving of steel, but prices in this country might be competitive.

Mr. R. N. Vanes [*A*] asked whether the private architect could think in terms of using the new material? Was it sufficiently developed in this country as yet, or should he forget all about it for the time being? If it had been developed, how did he set about getting it? If he succeeded in getting it, what would be the reaction of the L.C.C. and other similar bodies in connection with its use?

Mr. D. Brown Bullivant (Student) said he thought what was required was a range of beams of standard sections which could be used for normal small jobs in building. The architect could then have far more confidence in using prestressed concrete.

Mr. Ernest Seel [*A*] said that as one who had to spend a considerable amount of time with students, he had found in the past—and he imagined it would be the same in the future—that he was faced with prestressed concrete as another of the complete answers to all the problems that arose. He looked forward to the time when architects understood enough about prestressing and its possibilities to be able to discriminate between its suitable and unsuitable uses.

Mr. O. J. Masterman (Ministry of Works) said he was an enthusiast about prestressing and a great believer in it. Many advantages were being found in it, and the thing would soon settle down. They would know where best to use it and where to avoid it.

Mr. Elliott had covered the main advantages, such as the saving in steel, and concrete, and wood, and there were a host of other advantages. There was the shear stress, great flexibility, less deflection, and so on. One point he would like to emphasize, however, and that was the inevitability of the technical advance, for it was a technical advance, and an important one. They had come to a definite stop in the use of reinforced concrete. There was a limitation on the quality of steel that could be used for that purpose in reinforced concrete because of the cracking problem, and there they had been stopped. Then came the new technique of prestressing, which enabled a higher quality steel to be used, and so saved 75 to 80 per cent of steel weight and made possible the use of the higher quality concretes. That was why he firmly believed that this material would be made certainly as cheaply as reinforced concrete and perhaps more cheaply. It had been done on the continent by Freyssinet in France, Magnel in Belgium, in Sweden and in Switzerland. In this country a more difficult task had perhaps been attempted—to get cheap production with a very small unit, the floor joist. There was reason to think this would be successful. In addition to saving 75 per cent of steel, which was expected, it saved something like 30 per cent of concrete as compared with the corresponding reinforced concrete joist. If it could be done on that small unit, what could not be done on the larger construction?

Mr. A. F. Hare [*A*], referring to multi-storey buildings, said the scheme designed by Dr. Mautner made possible the use of rigid frames, and the assembly of columns and beams in rigid frames of one storey high. The advantage of prestressing in saving steel and so on also applied, but the main point was that the units were assembled by threading the cable through the length of the column and then through the ends of the beam, or through the length of the beam and the ends of the column. The joint was laid between beams and column as in the case of the bridge referred to. This enabled the units to be precast in a factory, taken to the site, assembled and erected in one-storey frames, or precast on the site and then prestressed and assembled in frames.

The Chairman expressed thanks to the audience, and particularly those who had taken part in the discussion. The Architectural Science Board, like other groups of people, were trying to do a public service. They were shot at from time to time from the right, by persons to whom the word 'science' caused allergy, for being too scientific, and from the left by those who said they were not scientific enough. In that category, Mr. Elliott's lecture would be left centre, that was to say, he had held a very useful balance between imparting technical information and indicating how it could be used. He felt sure everyone would agree with him that on a topic they had persisted in calling new—Mr. Elliott had told them it was some 50 years old—they had indeed learnt a great deal. He, therefore asked that the usual expression of thanks be accorded to Mr. Elliott for his address.

Mr. Elliott, in expressing his thanks to the audience, said it had been a very great pleasure to impart some knowledge of prestressing to them.

The cutting of prestressed units was quite possible if they were self-bonding, but it was not economic. The usual method was to make up a job from drawings and then order the materials. That was, after all, done with precast concrete products.

With regard to continuity, it was very simple to provide continuous members, especially with post-tensioning. The wire could be deflected within the unit. In fact, it could be put in horizontally to change the contour of the main structure element in order to distribute the stresses as wanted in any part of the job. The hangar in Belgium had an upward cant on the beam, which meant that there was a certain amount of compressive strength at the ends in order to provide some rigidity to the frame. In the case of self-bonded wires it was a little more difficult. It could be done by the simple method of making the framing jointed at the points where the stress changed from compression to tension. That was a more satisfactory approach to providing continuity for precast concrete work. He still thought it possible to provide a re-entrant cable over the points of continuity in order to provide some stressing at that point. He was glad to hear the keenness of Mr. Bramer's company to carry on with the production of the Stahlton floor.

With regard to the ability to knock holes in small beams, that was a somewhat antiquated method. It would be better to cast a series of holes down the span of the beam.

In the case of a large framed building it was possible to make some provision in the frame design to carry out prestressing on the site. There was also a point about two-way reinforcement: the two-way reinforcement of a floor was quite possible in prestressing, and the same relative results were achieved as in the case of reinforced concrete.

For continuity there was a better method than reinforced concrete rods. A type of rod had been invented some time ago which was rigid, and the wires were pre-tensioned round it. The rod was then cast into concrete with the wires, and at a later stage the concrete was set and the rod could be taken out.

It was possible to precast in the curve direction. There were also systems of prestressing that way by using external ties in the same way as a rod.

He was very pleased to hear from Mr. Ewing of the efforts being made by the Ministry of Works to encourage the use of prestressed concrete. The steel position was very serious, and he felt sure the Ministry were looking to it very thoroughly.

Inauguration of the Kingston-upon-Thames District Chapter

THE INAUGURATION of the new Kingston District Chapter of the South Eastern Society of Architects took place on 29 October in the Guildhall, in the presence of the Mayor and Mayoress of Kingston-upon-Thames, and a large gathering representative of neighbouring local authorities and other public bodies and, of course, representatives of the various Chapters of the South Eastern Society.

The guests were received by Mr. Arthur J. Stedman [*F*], President of the South Eastern Society, and Mrs. A. P. Tice, the Mayor and Mayoress of Kingston-upon-Thames, and Mr. H. Norman Haines [*L*], first Chairman of the Kingston-upon-Thames District Chapter, and Mrs. Haines. After cocktails had been served, the company moved into the Council Chamber. Mr. Arthur J. Stedman welcomed the creation of the Kingston Chapter on behalf of the South Eastern Society. After quoting the aims and purposes of the South Eastern Society, he explained how the Kingston Chapter had come to be formed, and how this accorded with the functions of an Allied Society. He ended by declaring the Kingston-upon-Thames District Chapter duly inaugurated.

Mr. H. Norman Haines, who was in the chair, in reply said that in forming the Kingston Chapter they had had the greatest goodwill and support from the Guildford Chapter, to which most of their members had formerly belonged. He gave a list of the local authority areas which were covered by the new Chapter, and said that every effort was being made to enrol architects who lived in those areas. He concluded by saying that they were proud to be in alliance with the Royal Institute of British Architects and to belong to the Royal and Ancient Borough of Kingston.

Mr. Frederick Barber, M.B.E. [*F*], Vice-Chairman of the Kingston Chapter, welcomed the guests and thanked the Town Council for allowing them to use the Guildhall for their inaugural function. The Mayor of Kingston, Councillor Mrs. E. H. R. Oldfield, M.B., C.L.B., D.P.H., J.P., replied, and said that the inauguration of the Chapter was a happy event in the life of Kingston, and she wished the Chapter every success.

Mr. Arthur W. Kenyon, C.B.E. [*F*], Vice-President, R.I.B.A., delivered a message of greetings from the President, Mr. Michael T. Waterhouse, who was unable to be present. He referred to the very great importance of regional associations of architects in Allied Societies. They were able to look after local matters concerned with the advancement of architecture, and with amenity and town planning in a direct way which was impossible for the London headquarters of the Royal Institute; the importance of local contacts indeed could not be exaggerated He offered his personal good wishes to the Chapter.

Brief speeches of welcome were then made by Mr. R. Duncan Scott [*F*], Chairman of the Guildford Chapter, Mr. W. J. Thrasher [*A*], Chairman of the Brighton Chapter, Mr. C. S. Spackman, F.S.A. [*L*], Chairman of the Croydon Chapter, and Major F. A. Perren [*F*], Chairman of the Canterbury Chapter. The Chairman, Mr. H. Norman Haines, then described how the Chapter had been formed, and he mentioned by name many who had given help and advice. He wished specially to thank Mr. G. Maxwell Aylwin [*F*], Mr. R. Duncan Scott [*F*], Mr. S. G. Livock [*F*], Mr. F. Barber [*F*], Mr. R. F. Alner [*L*], Hon. Treasurer of the Chapter, Mr. C. A. Trimm [*A*], Hon. Auditor of the Chapter, and Mr. L. C. F. Varcoe [*F*], first Hon. Secretary of the Chapter. He then gave a brief account of forthcoming activities of the Chapter.

The company then retired to the ante-room, where refreshments were served and members spent a pleasant evening of introductions and conversation.

In addition to those already mentioned, the official guests included the Mayor and Mayoress of Surbiton; the Mayor and Mayoress of Epsom and Ewell; the Chairman of Esher U.D.C.; the Vice-Chairman of Merton and Morden U.D.C.; the Town Clerk of Kingston, Mr. A. W. Forsdike and Mrs. Forsdike; the Hon. Secretary of the South Eastern Society, Mr. Colin H. Murray [*F*], and the Hon. Treasurer, Mr. Cecil Burns [*F*] and Mrs. Burns; Mr. W. R. Ellis, O.B.E., T.D., M.A.; Assistant Secretary of the R.I.B.A., Mr. E. L. Bird, M.C. [*A*], Editor of the R.I.B.A. JOURNAL; the Borough Surveyors of Kingston, Surbiton and Epsom and Ewell; the Surveyors of Banstead, Esher, and Merton and Morden; Alderman W. E. St. Lawrence Finny and Mrs. Finny, J.P.; the President of the Kingston Rotary Club; the Chairman of the Kingston Chamber of Commerce, and the Chairman of the Kingston Round Table; the Principal of the Kingston School of Art, Mr. R. Brill and Mrs. Brill; the Vice-Chairman of the L.M.B.A. (South Western Region). Arrangements were in the hands of the Hon. Secretary of the Chapter, Mr. D. Phillimore Taylor [*A*].

Practice Notes

Edited by Charles Woodward [*A*]

TOWN AND COUNTRY PLANNING ACT, 1947. The following list of Statutory Instruments and Directions have been made by the Minister, together with the relevant Circulars issued by the Ministry.

Statutory Instruments. The Central Land Board Regulations, 1947 (S.R. & O. 1947, No. 2294), price 1*d*.
The Town and Country Planning (Authorization of Delegation) Regulations, 1947 (S.R. & O. 1947, No. 2499), price 1*d*.
The Acquisition of Land (Claims for Adjustment of Compensation for War-damaged Land) Regulations, 1948 (S.I. 1948, No. 207), price 1*d*.
The Town and Country Planning Act, 1947 (Appointed Day) Order, 1948 (S.I. 1948, No. 213), price 1*d*.
The Town and Country Planning (Making of Applications) Regulations, 1948 (S.I. 1948, No. 711), price 1*d*.
The Claims for Depreciation of Land Values Regulations, 1948 (S.I. 1948, No. 902), price 3*d*.
The Town and Country Planning (Use Classes) Order, 1948 (S.I. 1948, No. 954), price 2*d*.
The Town and Country Planning (Use Classes for Third Schedule Purposes) Order, 1948 (S.I. 1948, No. 955), price 2*d*.
The Town and Country Planning (General Development) Order, 1948 (S.I. 1948, No. 958), price 5*d*.
The Town and Country Planning (Enforcement of Restriction of Ribbon Development Acts) Additional Regulations, 1948 (S.I. 1948, No. 1126), price 1*d*.
The Town and Country Planning (Development Charge Exemptions) Regulations, 1948 (S.I. 1948, No. 1188), price 2*d*.
The Town and Country Planning (Development Charge) Regulations, 1948 (S.I. 1948, No. 1189), price 1*d*.
The Town and Country Planning (Transfer of Property and Offices and Compensation to Officers) Regulations, 1948 (S.I. 1948, No. 1236), price 5*d*.
The Town and Country Planning Acts, 1944 and 1947 (Registration of Orders and Lists of Buildings) Rules, 1948 (S.I. 1948, No. 1213/L9), price 2*d*.
The Town and Country Planning (Erection of Industrial Buildings) Regulations, 1948 (S.I. 1948, No. 1309), price 1*d*.
The Stopping Up of Highways (Concurrent Proceedings) Regulations, 1948 (S.I. 1948, No. 1348), price 1*d*.
The Town and Country Planning (General) Regulations, 1948 (S.I. 1948, No. 1380), price 2*d*.
The Town and Country Planning (Tree Preservation Order) Regulations, 1948 (S.I. 1948, No. 1436), price 1*d*.
The Town and Country Planning Delegation (London) Regulations, 1948 (S.I. 1948, No. 1459), price 1*d*.
The Town and Country Planning (Local Authorities Land: Exceptions to Section 82) Regulations, 1948 (S.I. 1948, No. 1461), price 1*d*.
The Town and Country Planning (Enforcement of Restriction of Ribbon Development Acts) Regulations, 1948 (S.I. 1948, No. 1520), price 1*d*.
The Town and Country Planning (Minerals) Regulations, 1948 (S.I. 1948, No. 1521), price 2*d*.
The Town and Country Planning (Modification of Mines Act) Regulations, 1948 (S.I. 1948, No. 1522), price 1*d*.
The Town and Country Planning (Control of Advertisements) Regulations, 1948 (S.I. 1948, No. 1613), price 8*d*.
The Town and Country Planning (Building Preservation Order) Regulations, 1948 (S.I. 1948, No. 1766), price 2*d*.
The Town and Country Planning (Development Plans) Regulations, 1948 (S.I. 1948, No. 1767), price 3*d*.
The Town and Country Planning (Development by Local Planning Authorities) Regulations, 1948 (S.I. 1948, No. 2302), price 2*d*.

Directions. The Town and Country Planning (Minerals) Direction No. 1 (S.I. 1948, No. 1437), price 1*d*.
The Town and Country Planning (City of London Applications) Direction (S.I. 1948, No. 1460), price 1*d*.

Circulars. No. 61. Development by Local Authorities and Statutory Undertakers.
No. 62. Development Charge on Houses for Members of the Agricultural Population.
No. 47. Explanatory Memorandum of General Development Order, price 3*d*.
Explanatory Memorandum on Minerals Regulations and Mines Act Regulations, price 2*d*.
No. 56. Explanatory Memorandum of Control of Advertisement Regulations, price 1*d*.
No. 57. Local Authorities Land: Exceptions to Section 82, price 1*d*.
No. 58. Explanatory Pamphlet, Land Ripe for Development, section 80, price 1*d*.
Explanatory Memorandum on the Act, Part 2, price 2*s*.
No. 53. The Coming Into Operation of the Act, price 1*d*.
No. 54. Grant Regulations, price 1*d*.
No. 41. Making of Applications.
No. 40. Notes on Survey Work for Development Plans.

These publications are obtainable at H.M. Stationery Office.

Schemes in Force Under Previous Planning Acts. Circular No. 60, issued by the Ministry of Town and Country Planning, contains a list of Operative and Varying Schemes under Town Planning Acts, 1909 to 1925, and the Town and Country Planning Act, 1932, according to the Ministry's records.

It is intended that all schemes still in existence should be determined as soon as possible, and they are only being kept alive temporarily in regard to the five matters referred to in paragraph 7 of the Tenth Schedule of the Act. Each Local Planning Authority should consider whether any scheme in their area needs to be retained for any of the five purposes. If not the Authority should apply to the Minister for an Order to determine all the remaining provisions of that scheme. If any of the five provisions ought to be retained the Authority should so inform the Minister and he will determine a scheme except for the provisions desired to be retained. Authorities are asked to act accordingly. The Circular is dated 11 October 1948.

Land Held on Charitable Trusts, Section 85. The Ministry have issued a leaflet, P.R.4 dealing with the application of the Act to land held for ecclesiastical and charitable purposes, and pointing out the rights of charities under the Act. Copies of the leaflet may be obtained from the Ministry at 32 St. James's Square, S.W.1.

Central Land Board. Builders' near Ripe Land. The Central Land Board announce an amplification of their recent pamphlet on builders' near ripe land S.I.A./N.R.

If builders' near ripe land (that is to say land which a builder has already claimed as his near ripe ration or intends to claim as such in the future) is sold or leased before being developed, near ripe treatment will not be granted if the land is sold coupled with any assignment of the right to the payment due in respect of the land from the £300 million fund. Any land sold on these terms will be excluded from the builders' near ripe ration.

If the builder desires to sell or lease near ripe land before it is developed, the land must be disposed of either at existing use value, or, if immediate development is contemplated and development charge has been determined by the Board on the application of the builder himself, at a price inclusive of development charge.

The intention of the builders' near ripe scheme is not that claims on the £300 million fund should be sold by a builder by an assignment of his rights. (15 October 1948.)

Development Charge and Monopoly Value. The Central Land Board have formulated their procedure for determining a development charge in respect of on-licensed premises about to be built, and premises for which it is proposed to apply for a licence (i.e., those hitherto used for another purpose).

The charge will first be assessed in the ordinary way as if no monopoly value were payable. Then:

(*a*) In the case of a new licence (including cases to which Section 73 of the Finance Act, 1947, apply), the actual monopoly value assessed for the new premises will be deducted, and the resulting figure will represent the charge.

(*b*) In the case of an ordinary or special removal, the notional monopoly value of the old premises will be deducted. If the removal is accompanied by surrender of other licences, their notional monopoly value will also be deducted.

(*c*) In the case of a planning removal, the notional monopoly value of the new premises will be deducted. This method is considered inevitable in view of the vagueness of the value of 'pool' licences to be offset against it.

Fees Where 'Dead-Ripe' Certificate is Applied For. The Central Land Board have received enquiries from owners of land and their advisers on the question of professional fees where an S.I. claim is submitted in respect of land for which a 'dead-ripe' certificate has also been sought from the Minister of Town and Country Planning under Section 80.

The Board have already advised such claimants to submit an S.I. before 31 March 1949, to guard against the possibility that their 'dead-ripe' certificate may not be granted. They now further advise that in these cases questions 27 and 28 should not be answered. If, subsequently, the certificate is refused, the S.I. will be returned by the Board for these questions to be answered, and the normal provisions regarding fees will apply.

Single-plot Owners: Payment and Claims. On 30 July 1948 the Central Land Board announced arrangements affecting private owners who owned single plots before 7 January 1947. These arrangements entitled such owners if they start to build a house on the plot for their own occupation on or before 7 January 1952, to a payment from the £300 million fund equal to the development value in the land for the erection of a house. This should mean, in the absence of any marked change in market values, that the payment from the fund will broadly cover the development charge.

Consideration has since been given to the position of similar owners who bought their plots between 7 January 1947 and 1 July 1948, the appointed day for the coming into force of the Act. The Board has in consequence been authorized to extend this concession to such owners.

The payment from the fund will not be available until after the Scheme for payments has been made and approved by Parliament, but these owners will be able to set off their development charge against it. They must, of course, put in a claim for a payment before 31 March next, and the Board advise them to do so as soon as possible.

The concession will also apply to persons who were under binding contract to purchase or lease plots on 1 July 1948.

Central Land Board and Building Sites for Houses. Advice to Buyers and Sellers. The following advice to buyers and sellers of sites for building houses has been given by the Chairman of the Central Land Board:

Advice to Buyers. The following advice is offered to anyone who wants to buy (or take a lease of) a piece of land for a house, and it does not necessarily apply to sites where there have been buildings before, for example war-damaged sites. In these cases advice can be obtained from an office of the Board.

1. Remember that building value now belongs to the State and not to the seller.
2. *Always* ask first (and before the price is settled) whether the development charge is going to be paid to the Central Land Board by you or by the seller.
3. Do not buy as part of the purchase price of the land the seller's claim on the £300 million fund. The right to a payment from the fund is not yet established, and its amount cannot yet be known. The amount will in any case be related to the circumstances of the owner of the land on 1 July 1948, and not to those of any new buyer. A buyer of such a claim is therefore buying a risk at a 'certainty' price.
4. If the *seller* agrees to pay the development charge ask him the amount which he has agreed with the Central Land Board. You can then safely pay building value for the land in the knowledge that you yourself will not be liable for any development charge, when the seller has paid it.
5. If *you* are to pay the development charge (and, unless the seller is willing to pay it, you will have to do so) you should never pay building value for the land. If you do, you will be charged the building value over again in your development charge. You should pay what is known as existing use value and no more. A rough guide to existing use value is its value to use it as it is actually being used (as, for example, agricultural, allotment, or garden land) with a prohibition against erecting any building on it except for agriculture.

Advice to Sellers. Three courses, which will be fair to buyers who want a house immediately, are open to sellers of land:

A. To sell the land at existing use value, leaving the buyer to pay the development charge (Method A).

B. The seller to pay (or agree with the Board to pay) the development charge; to disclose the amount of this charge to the buyer; and then to sell the land at a fair price, including the development charge, direct to the person who wishes to erect the house. This method, *after discussion and agreement with the Board*, can be used either for a sale to a named buyer, or by public or other advertisement, or by auction. (Method B.)

C. The seller to pay the development charge; erect the house himself; and then sell the house and land at a fair price, including the development charge (Method C).

Owners of land with building value on 1 July 1948 have been given a right by the Act to make a claim *before* 31 March 1949, upon the fund of £300 million set aside to meet varying cases of hardship. No promise has been given that *everyone* will be paid the whole of the market value of his loss of building rights. Indeed, clear statements have been made to the contrary, and that *some* will receive the whole loss and that *some* will not. The decision will not be made (except in the case of 'near-ripe' land) until 1952 or 1953, and then by a Scheme which will require affirmative approval by Parliament. Payments will be made in 1953.

A sale of land therefore at a price which includes building value is unfair to buyers for two reasons:

1. It passes on the claim to the purchaser at a definite amount, whereas the claim is as yet unestablished and the amount is unknown.
2. It forces the purchaser to pay for building value twice over in two *immediate* payments (the purchase price and the development charge). This places an intolerable burden on persons who have been carefully selected for a building licence on their urgent need for a house.

In normal cases, therefore, where an owner is not prepared to sell at a price related to Method A, B or C, the Central Land Board will have to consider the various compulsory purchase powers in the Act.

If sellers will sell, and purchasers will only buy, as advised in this pamphlet (House 1), land can be sold at a price which will not hinder or prevent houses being built. (25 October 1948.)

BUILDING LICENCES. The Minister of Works has made an Order that as from 1 November 1948, £1,000 may be spent upon the following classes of building up to 30 June 1949 without a licence, and this includes the cost of previous work done on the property since 1 July 1948 without a licence. The classes of building are as follows:

Buildings used wholly as factories.
Warehouses.
Farm buildings (excluding farm houses).
Schools, universities and other educational buildings.
Office buildings with a floor space of 10,000 sq. ft. or more.

Where there is more than one such building on a single property the maximum amount which may be spent without licence on the whole property will still be £1,000. The limit of £100 for the year beginning 1 July 1948 will still apply to houses, shops and all buildings not specially mentioned above.

The Control of Building Materials Order will be cancelled as from 1 November 1948, and on and after that date W.B.A. Priority Certificates (B.M.104) will cease to be in use. This cancellation does not affect timber or steel, and their allocation will be in accordance with present arrangements. (The Control of Building Operations (No. 12) Order, 1948. S.I. 1948, No. 2332.)

MINISTRY OF WORKS. Following a rise in the cost of lead, the Minister of Works has authorized an increase of £23 5*s.* per ton in the maximum selling prices of lead sheet and pipe from 8 October 1948.

MINISTRY OF HEALTH CIRCULARS. Circular 169/48, dated 30 October 1948, refers to the cancellation of the W.B.A. priority scheme for the distribution of materials as from 1 November 1948. Where there is special difficulty in obtaining delivery of materials the Ministry's Regional Progress Officer should be consulted.

Licences may now be issued for work of reconditioning or improving existing houses within the agreed licensing arrangements, and paragraph 7 of Circular 40/48 is cancelled.

The appendix to this Circular contains guidance to Licensing Officers in respect

of the spending of the 'free limit', which may be prescribed from time to time by Orders under Regulation 56A. The guidance is as follows:

1. The 'free limit' is available during the prescribed period, irrespective of the value of the work for which a licence may have been granted.

2. The 'free limit' should not be deducted from the figure of cost shown on the application for a licence. This figure must be directly related to the amount of work to be done and licensed. If what may be left of the 'free limit' is not enough to cover the cost of the work required to be done, a licence should be issued for the full cost of the work, leaving the balance of the 'free limit' in the hands of the applicant for future use.

3. The 'free limit' should not be deducted from the amount shown on an annual maintenance licence.

ROYAL INSTITUTION OF CHARTERED SURVEYORS. In Practice Notes in the last issue of the JOURNAL it was stated that under the revised Scale of Charges issued by the Royal Institution the fees for valuers in cases of compulsory purchase of property had been doubled.

This statement was incorrect and is regretted. The increase over the previous Scale is 50 per cent.

Review of Construction and Materials

This section gives technical and general information. The following bodies deal with specialized branches of research and will willingly answer inquiries.

The Director, The Building Research Station, Garston, near Watford, Herts. Telephone: Garston 2246.

The Director, The Forest Products Research Laboratory, Princes Risborough, Bucks. Telephone; Princes Risborough 101.

The Director, The British Standards Institution, 28 *Victoria Street, Westminster, S.W.*1. *Telephone; Abbey* 3333.

The Technical Manager, The Building Centre, 9 *Conduit Street, W.*1. *Telephone; Mayfair* 8641-46.

National Playing Fields. The National Playing Fields Association have published a booklet, under the title of *Specification of Playing Facilities*, in the hope that it will help to ensure a higher standard of construction generally, and provide a more reasonable basis for competitive tendering. The draft specifications were submitted to a special technical sub-committee of the Association comprising representatives of certain professional and trade organizations, including the R.I.B.A. Specifications are given for grass areas (preparation, liming, seeding, and so on); for hard tennis courts, bowling greens, running tracks, children's playgrounds, and cycle tracks. A suggested form of tender and a blank schedule of rates are included, and also detail drawings for hard tennis courts and bowling greens. The booklet may be obtained from the Association, 71 Eccleston Square, Belgrave Road, London, S.W.1, price 2*s*.

General Foreman. If there is one person on a job who is worthy of respect, besides the Clerk of Works, it is a good general foreman. It may truly be said that he is worthy of sympathy also, for his duties and responsibilities increase almost daily while he tries to cope with new regulations and forms, of which few were in use when he took the plunge and decided to become a general foreman. For it is a plunge; as foreman carpenter or bricklayer he need be master only of his own trade, with a general knowledge of other trades that touch his own, but as a 'general' he must know practically everything connected with building, and this may deter trades foremen who feel a lack of knowledge and experience in some branches of the industry, especially in the organization of a job.

It is, therefore, particularly interesting to read the Report on the Training of General Foremen, as approved by the National Federation of Building Trades Employers and presented by an *ad hoc* committee set up by them, as they say there is at the present time a shortage of capable general foremen. In February last the N.F.B.T.E. asked the Institute of Builders, the Ministry of Education, the London Builders' Foremen's Association, and the National Federation of Clerks of Works and Builders' Foremen to participate with them in the formation of an *ad hoc* committee to formulate 'a short term scheme for the training as general foremen of adult male craftsmen in the building industry'. The invitations were accepted and the committee held frequent meetings, keeping the following assumptions before them: that modern developments in building technique have emphasized the need for an organized system of training in the duties and responsibilities of general foremen; to formulate and set up a system of technical education and training for men capable of qualifying for supervisory posts in the building industry would take some time, and a further period must necessarily elapse before men trained under it would be available to the industry; that in view of the shortage of general foremen and of the key position they occupy in the industry, it is thought imperative that, before dealing with the general question of training for supervisory posts on a long term basis, attention should first be concentrated on the problem of training for general foremanship on a short term basis; and lastly, that there are many men of mature age with craft training and experience as craft foremen who, with some special training and in a short period of time, would make capable general foremen.

The committee made recommendations that short intensive courses in the duties and responsibilities of general foremanship be provided at all technical colleges serving areas where the need for such courses exists, and that these courses should be open to craftsmen of mature age with at least a good elementary education and other specified qualifications, and who are recommended by their employers or are accepted by an interviewing panel. The courses would still be open to those not possessing the specified qualifications, if they are recommended and accepted by the interviewing panel.

Alternative suggestions are made regarding times of instruction, which is to include an introductory general survey of responsibilities, elementary mensuration and surveying, revision of general building practice, site planning and organization, site administration, and personnel management and welfare. It is also suggested that the satisfactory completion of the course be marked by the issue of an appropriate certificate. Six appendices set out the syllabus for these short term courses, and even under short headings the list of subjects looks formidable, showing that a good deal of study is required to make a good foreman, and master craftsmen should be grateful to the N.F.B.T.E. for providing the means by which they can rise to the responsible and highly respected position of general foreman.

The project has aroused a considerable amount of interest, not only in but also outside the industry, and it is hoped to begin the courses during this autumn and winter, in some twelve centres, with the co-operation of the Ministry of Education.

B.S.I. Standards Review. British Standards are rightly written in formal language, without flights of fancy or anything approaching the lighter touch. But periodically the staff of the Institution allow themselves a little relaxation from the specification style, so in the Standards Review No. 8, July 1948, we find them quoting Gilbert, Punch, Shakespeare, Isaiah and Bacon, and telling us about some published Standards in easy, conversational language, with information of a general nature about the subject. The Review also contains extracts from an address given by Mr. Percy Good, Director of the B.S.I. to the Institution of Electrical Engineers, in which he referred to the history and philosophy of standardization, and said: 'I am satisfied that an inquiry should be made by each industry into the economics of dimensional standardization from the points of view of interchangeability and the elimination of unnecessary types and sizes. Thousands of different types and sizes are available where hundreds, and in some cases dozens, would meet requirements'.

Correspondence

THE WORK OF THE R.I.B.A.

Sir,—I have just finished reading the second part of the 'Work of the R.I.B.A.' (October JOURNAL) and I really must congratulate you on a wonderful and most useful piece of work. To cover so much ground on so many subjects and to make it eminently readable all through is a real achievement. I have read it from start to finish with a microscopic eye, and candidly I have simply no criticism to make. It just could not have been better done. It warmed the cockles of a groggy old heart to read such an inspiring account of the many-sided work of the Institute and of the long process of development that has built up what I firmly believe to be the finest professional institution of its kind in the world.

Of course it is nonsense to think of it as mainly the work of one man. It is true that one man had the privilege of being inside when the work was going on, but it was the result of the combined and continuous efforts of hundreds, if not thousands, of members who gave devoted service to the profession and to their fellow members without reward, mostly without recognition, and in many cases at the cost of serious sacrifice in their own material interests.

If members generally do not appreciate what has been done for them and what is being done for them every day it is their own fault and their own serious loss.

It may be that the paper problem makes the idea impracticable, but I should love to see these two sections bound together and printed as a separate R.I.B.A. pamphlet and kept on sale for a long time to come, until, in fact, the time had come for a new edition giving an account of fresh activities and triumphs.

During the last forty years I often came across members who said, 'What is the R.I.B.A. doing?' When I asked them whether they had read the Annual Report the answer, of course, was that they had not. Now every member and every student has been given the opportunity of knowing what he ought to know of the work of the great institution to which he owes so much. —Yours faithfully, IAN MACALISTER [*Hon. A*]

Sir,—I hope that the excellent outline of the work of the R.I.B.A. Library, in your last issue, will serve to remind members how much our library owes to the interest and generosity of individual members of the profession. It is this personal element which has made the library what it is; those who consider it as something 'laid on' for their use by an administrative process fail to appreciate its unique character.

No benefaction of recent times, or, indeed, in the library's history, has been more striking than Sir Banister Fletcher's gift of £700, which enabled us, from 1935 onwards, to produce one of the finest printed catalogues of which any learned society can boast. Perhaps, in view of your article, this is an appropriate moment to remind members of that noble donation and express, once again, our gratitude to its author.

JOHN SUMMERSON, F.S.A. [*A*],
Chairman, R.I.B.A. Library Committee

CONTROL OF URBAN REDEVELOPMENT

Sir,—Mr. P. J. Waldram's article on the control of urban redevelopment (August JOURNAL 1948) appears mainly to commend recent proposals, but he says there are serious defects in them. I could only identify two points, neither of which seemed to me substantial. One appears to be a suggestion for changing slightly the proposed angle for uniform obstructions, and the other the substitution of a no-sky line as a reference standard instead of a particular daylight factor contour. Neither raises any question of principle, and there are counter arguments which I need not detail here, but which will be quite apparent to anyone of Mr. Waldram's experience. Much more important is the fact that for the first time we have a clear idea of how central areas can be redeveloped to avoid the bad features of traditional technique, and what is needed now is wholehearted will and co-operation to make it work.

Is it really desirable to confuse this issue by lengthy discussion of minor points? Mr. Waldram argues on details of daylighting; but the arguments in terms of quietness, reduced fire risk, more open space and more scope for designers are equally important, and the only special significance of daylighting is that its geometry affords a convenient guide which equally facilitates all lines of improvement.

I think these ideas must command Mr. Waldram's real sympathy because he was a progenitor of one of the first clear examples; therefore I hope it will become apparent that the essential ideas have his full support. —Yours truly, WILLIAM ALLEN [*A*]

Sir,—In the August JOURNAL Mr. P. J. Waldram, in his article on *The Control of Urban Development*, makes several criticisms of the proposals made for the daylighting of buildings in the Ministry's Handbook, *The Redevelopment of Central Areas*.

In no other publication has the Ministry so far put forward its daylighting proposals, and the Handbook was clearly stated to be advisory. The Ministry welcomes constructive comment and criticism of any of the proposals in it, particularly from such authorities as Mr. Waldram, but it would be misleading to your readers if they assumed, as Mr. Waldram seems to have done, that this Advisory Handbook is a Ministry 'Directive', or that Local Authorities are 'now instructed . . . to comply with an official Daylighting Code.'

The Ministry, in preparing its Handbook, felt the need for a method of predetermining the daylighting conditions in areas to be comprehensively developed under the Town and Country Planning Acts, and in collaboration with the Department of Scientific and Industrial Research evolved the method described in Appendix 3 to the Handbook. When applied in conjunction with the suggested method of Floor Space Index control, it should enable Planning Authorities to determine in broad outline the building volume and its arrangement in various forms so as to ensure good daylighting conditions throughout the area to be developed or redeveloped, and for the surrounding buildings.

The method advocated does not, and was never intended to, predetermine with complete accuracy the daylighting conditions in every building in the areas to be developed.

Mr. Waldram is obviously sympathetic to the Ministry's desire to see better standards of daylighting applied throughout city centres than those now obtaining. The Ministry is ready to give every consideration to any simpler method than that which it has put forward, provided:
(*a*) it takes into account modern studies such as the 'Lighting of Buildings' Report;
(*b*) is applicable to the comprehensive development of our city centres;
(*c*) permits a degree of flexibility and freedom for the developer and his architect, which so far they have not been given.
—Yours faithfully, S. L. G. BEAUFOY [*F*]
Director of Technical Services: Ministry of Town and Country Planning

THE A.S.B. AND THE 'TIN TACKS' OF ARCHITECTURAL TEACHING

Sir,—In the August 1948 JOURNAL a Science Board report entitled 'The Teaching of Construction' was published by direction of the Council after circulation to the schools. We are left to guess at the reaction of the staffs to this pretentious document, which to at least one reader, seems to consist of little else than empty generalizing. There are, however, one or two ideas in the report so controversial or misleading as to demand comment.

There is, for one example, the proposal that students should make fewer working drawings, but devote more time to sketches and 'functional analyses of elements', whatever that may mean. Already it seems to be the case that many students, after a five years' course, regard themselves as finished architects, only to find they have to gain a living and experience, by making drawings of other people's schemes. It would do the younger men no service to relax the discipline involved in making thorough working drawings at school.

The report is full of pious suggestions for adding to the student's burden of 'research'. Not even satisfied to keep within the scope suggested by the title, the report goes on 'consideration must be given to the legal responsibilities of the architect with regard to the safety and comfort of operatives and to third-party liabilities in such matters as safety, noise, encroachment on light, etc.' It can, of course, be flatly stated that architects have no such responsibilities. Needless to say, they must have knowledge of the law affecting others, but to call this a branch of building science is absurd.

We have, I think, suffered too long the tedious proceedings of the Science Board. To quote a speaker at one of last year's meetings—'It was time to consider whether the A.S.B. lectures were to be architectural science lectures, and what sort of audience they were supposed to be for. To compare the lectures published in the R.I.B.A. JOURNAL with those given before other learned societies aroused considerable misgivings about the claim of architects to be members of a learned profession.'

I suggest the time has come for the status and future of the Board itself to be reviewed. The prominence it now obtains puts too much stress upon the sterile scientific attitude to our great calling.

Yours faithfully, DONALD H. MCMORRAN [F]

Mr. McMorran's letter was forwarded to Mr. M. Hartland Thomas [*F*], *who replies:*

The final paragraph of Mr. McMorran's letter is of interest. I should be very glad to hear from members their views about the Architectural Science Board and what its functions should be. Members who hesitate to put forward their opinions in writing before fully informing themselves about the current activities of the Board are invited to apply to Mr. Frank Woodward, Secretary to the A.S.B., for the *Review of the Work of the A.S.B. during the Session* 1947-48. This has been prepared to amplify the brief official report that has already appeared in the JOURNAL. Letters about the Board may be addressed either to me personally or to the Editor for publication in the JOURNAL. It is not necessary, in order to gain attention, to adopt Mr. McMorran's vitriolic mode of expression.

M. HARTLAND THOMAS,
Chairman, Architectural Science Board.

PRACTISING FROM HOME

Sir—There must be an appreciable number of members who run practices from their own homes. It appears that before such a practice could legally be established it would be necessary for Town Planning Consent to be obtained (which might not be possible) and, probably, a Development Charge paid on the change of user of part of the house from domestic to professional. The amount of this charge might very easily be so large as to prevent a small practice being established at all, and in any case must act as a deterrent.

It is, of course, quite usual for people in other professions to work at home, but they can do so with clear consciences, being ignorant of the law, and with a certain degree of security, the law being ignorant of them. It is, however, the business of the architect to know these things, and, furthermore, he is constantly in communication with the Planning Authority, who cannot fail to note his address.

The matter is obviously one of very great importance to younger members setting up in practice for the first time, and whose resources may be inadequate for the renting of an office, and any light which could be thrown upon it would be valuable. —Yours faithfully, JOHN E. STUPPLES [A]

'THE GOLDEN SECTION'

Sir,—When we read jejune or mischievous articles in the popular press few of us are sufficiently disturbed by them to retaliation more damaging than a shrug of the shoulders. When, however, some pages of manifest juvenilia appear in the JOURNAL of our own Institute it is a different matter and feeling is stronger, for in the former case we need not feel personally involved in any consequent loss of reputation to the paper in which the offending article appears, while in the latter such feeling can hardly be avoided. It is a matter causing some surprise and no little concern to other architects besides myself that such an article as that appearing under the above title should be printed at all; but that it should appear in the particular issue which, on other pages, sets forth with justice the Institute's functions as a learned Society is inexplicable.

Since it is evident that not everyone agrees with this, I should like to submit the following brief criticisms out of the many which could be made.

The first and most obvious is contained in the fact that there is at least one other 'analysis' of the Parthenon. It is by Hambridge and is illustrated in *Design This Day* by an American designer, Walter Dorwin Teague. It is so different from Manning Robertson's 'analysis' that I am tempted to think that there may be as many others as we have inclinations. In fact 'it is beyond belief that the correspondence between the scaffold and the design can be due to' anything other than wishful thinking.

If Manning Robertson was propounding a method of setting up a design his illustrations are singularly unhelpful. Apart from the fact that they are drawn with instruments, they show no other consistency than that the slopes joining the supposedly significant points are identical or simply related. Much the same might be said of measurements made with a scale divided into inches and their simple parts. If he was trying to interest us in mathematics he was one of the few mathematicians who have managed to be more than two thousand years out of date. If he was endeavouring to create, and to become a high priest of, a mystique of architecture, to make a mystery of an activity which, by its very nature, is self-revealing, or to regain for the Art the reputation of being an intellectual pursuit of the highest order, then the conclusion of his thesis could hardly be expected to further such endeavours, for not only does he confess failure to understand what it all means, but also he admits his ignorance of what precisely is unique about the 'Golden Section'.

To attempt to reduce a whole realm of visual æsthetics to one or even a few propositions in Euclid is absurd. If it were not, if these pitifully naive, quasi-metaphysical notions comprised the secrets of architecture, then, for heavens sake, keep it dark.—Yours faithfully,

J. C. HOLMES [*Student*]

HARLOW NEW TOWN

Sir,—From the illustrations of the above in the October issue it is clear that the type of architecture selected is likely to be repugnant to a very large number who will not pay for it with undiluted joy, and who may even perforce have to live amongst it.

The liberty now available to authority to inflict what a minority may think good for us, and in spite of us, may possibly have stifled consideration for the sentiments of the large number who still cherish grace in the arts, and who will never be reconciled to modern crudity when not kept decently out of sight in 'art' shows. No amount of precious stuff about æsthetics, or mutual back-scratching by the devotees, will serve to abate this repugnance, for it has been clearly shown by the later French and the Russians that the modern outlook can be achieved without such extremes.

It looks as if this type of design is contemplated for the other new towns also, and I doubt whether there is really a mandate for it. The thoughts of most are now devoted to the nostalgia of the beauty which has slipped away rather than to the creation of new worlds, brave or otherwise, and the age of the debunker is past. Thus it will be very 'dated' stuff, but perhaps it is intended for the display of bigger and better white elephant posters!—Yours faithfully, PHILIP C. HARRIS [F]

THE U.N. BUILDING

Sir,—On reading Mr. J. J. P. Oud's admirable reply regarding the U.N. Building one becomes all too aware of the red light which spells deadlock. Be that as it may, architects' heads are notoriously hard (and frequently bemused!) from beating them against walls scrawled regrettably with such tags as traditionalism, functionalism, symbolism, eclecticism, etc., nevertheless Mr. Oud's letter remains a remarkably lucid and searching criticism of the weaknesses inherent in the 'functional idiom'.

This uncompromisingly functional approach of the building in question would appear to be Mr. Oud's chief worry, an approach which admits to no 'æsthetic expression in the language of architecture'. The authors have certainly produced an open plan (to some critics it is not open enough as it admits to little possibility of future extension!), but to my mind this particular approach does not necessarily kill off any chance of æsthetic expression; to many people a broad treatment such as this represents enhanced æsthetic value; however, on this point I would willingly leave the final issue to Mr. Wallace Harrison, a designer of proved talent and integrity.

This leads to the question of the site. Mr. Oud thinks it a bad site. He is probably right. That it is situated on a rather dreary stretch of East River is true; there are certainly more beautiful places in the world than this. Mount Athos, on the culmination of one of Haussmann's vistas in Paris would be infinitely preferable, but New York was chosen, and New York (at least Manhattan) is a claustrophobic city. A more elysian setting could have been obtained at Washington (or even Flatbush).

but the chosen site happens to be situated conveniently from the transport aspect and the urgency of the task to be carried through in the building needs bearing in mind.

As to my stressing of the need for eclecticism in its broadest sense, I remain unabashed. Possibly this may be interpreted as a slightly Freudian excuse for following no particular path, but to my mind what is good for New York is not necessarily good for London or Capetown. Architecture is nothing if not a conditioned art.

On the question of the design's spiritual worth I will not essay a view, but I see no reason why the work of a group of designers should be inferior in æsthetic expression to that of one man. In the case of a single mind a conception of this size, however brilliant, has a large chance of remaining a votive expression of one particular architect's ego. It is worth while noting that Mr. Lewis Mumford in his NEW YORKER article of almost exactly one year ago, also criticizes this aspect of the scheme, complaining somewhat broadly that the building does not symbolize the case of public relations for the New World Order. For my own part I find symbolism of this sort rather too ingenuous; spirituality, yes, but here again such emotionalism that should be infused into architecture is obviously a question of degree. Lastly, the question of style. The scheme is denounced as being dictated by fashion and that it lacks style. On this point I agree, style is the essence of architecture, but as in all things, it is purely relative, relative in the personal and in the time sense. One remembers Swann pursuing Oddette for nearly 500 pages of Proust, only to discover when she was finally his that she was, alas no longer in *his* style.—Yours faithfully,

EDWARD PASSMORE [*A*]

Book Reviews

The Painter Jacques-Louis David, by *Helen Rosenau.* 8½ in. 83 incl. xv pp + front. + xvi pls. text illus. Nicholson and Watson. 1948. 10*s.* 6*d.*

Dr. Rosenau examines the stylistic development of David as the chief exponent of neo-classicism in painting and as the official artist of Revolutionary and Napoleonic France. There is an attempt to assess the significance and influence of the classic revival in painting in the context of the social and political movements of the period. It is not easy to follow any sustained argument; too many ideas are touched on and left undeveloped, and there is a general air of disconnected thought full of irrelevancies.

As an introduction to the painting of David this book is of little value. The author has been over anxious to reproduce as many of his works as possible, and the result is that a large picture like *The Three Horatii* is reduced to 1½ in. × 2 in. On this scale it is endowed with a fierce and stormy romantic feeling that is as far from its proper quality as could be wished, while the tones of the painting are falsified to a degree that is almost incredible. Unfortunately, many of the other illustrations are equally misleading, and textual reference to them has little point.

For a work with claims to scholarship there is a surprising lack of care in detail. Goya's *Caprichos* appear twice as 'Capprichios'; Canova's recumbent figure is variously described as Eliza Buonaparte and Pauline Borghese—the ladies were sisters, but surely not identical?—and the title of the book appears in four variants on title-page, cover, spine and jacket.

WILLIAM TOWNSEND

Architectural Construction, *&c.*, by *Theodore Crane.* 9½ in. ix + 414 pp. text illus. New York: Wiley; Lond.: Chapman and Hall. 1947. $6.00.

A text-book for practising American architects and students in architecture, architectural engineering and building construction by the Professor of Architectural Engineering at Yale. Since it is concerned entirely with American practice its value to English readers will be limited, although its general interest is obviously considerable.

Planning Outlook. Journal of the School of Town and Country Planning, King's College, University of Durham (Newcastle). 9¼ in. London, &c.: Oxford University Press. 15*s.* a year.

The contributors to the first number of PLANNING OUTLOOK are all members of the staff of the Newcastle School of Planning or of associated departments of the University. It can therefore be regarded as the first profession of their faith in an important experiment: a five-year University course in town and country planning. Professor J. A. Allen, in his editorial introduction, tells us that the Journal will be a 'vehicle for the publication of research by the staff' and that other contributors will attempt to define trends and assess experiments in many countries. This is the moment, now that the planning profession has the revolutionary weapon of the new act in its hand, for an independant campaigning journal of this kind.

The first article, by T. Findlay Lyon, is appropriately concerned with the influence of Patrick Geddes. The significance of Geddes has but lately been realized: his teaching was followed to good effect in the Abercrombie-Forshaw County of London plan, and more recently in the Abercrombie-Matthew plan for the Clyde Valley and the Mears plan for Central and South-East Scotland. The teaching of Geddes is the root of the Newcastle idea, with its recognition of the immense field of study involved in our modern regional outlook. Those who are not familiar with the 'folk planning' philosophy of Geddes will be stimulated by Findlay Lyon's thoughtful essay.

Professor Daysh makes an almost too modest claim for recognition of the geographer's part in planning, and J. Charlesworth underlines the advantages of the new act.

Brian Hackett writes of the highly developed sense of urban landscape in Sweden—an approach to three-dimensional planning much more fundamental than mere town adornment. The important influence of landscape design on town and country planning has been recognized for a long time in American universities. It has been neglected in this country, and it is good to see that in Newcastle the teaching of landscape, based on the elements of agriculture, is an important binding element of design throughout the course.

In Bruce Allsopp's essay, *Planning for Delight*, there is a plea for a 'close alliance' between architect and planner. With planning so organized today by technique and standard and legal device, we risk losing the architect's inspiration for the planner's stock-in-trade. The solution is not for architects to claim all rights to creative planning, but for planners to be trained to comprehend the significance of design in the whole field of their work and to recognize the authority of the architect in problems of civic design.

The Newcastle school seems to be aware of this. It recognizes the specialist contribution of the architect-planner in the design of central areas, industrial estates and housing neighbourhoods; of the engineer-planner in systems of communications and services. But it also recognizes that the full range of regional planning, with all its social, geographical, industrial, agricultural and landscape implications, can no longer be properly taught as an adjunct to architecture or engineering, but must have scope to develop as a creative science on its own.

Architects, having helped to achieve recognition for this wider planning outlook, will be wise to equip themselves for those immense town-planning tasks which remain their special province, resisting claim to omnipotence in the regional planning realm. R. GARDNER MEDWIN [*A*]

Architects', Builders' and Civil Engineers' Reference Book, 1948. *Evelyn Drury* [and others], editors. (Articles by H. E. Beckett [and others].) 2nd ed. [of A—, B— & C—E— technical catalogue]. 10¾ in. × 8 in. 880 pp. incl. advts. text illus. Newnes. 1948 £2 12*s.* 6*d.*

A revised and amplified edition of a volume first published in 1946 under the title of Architects', Builders and Civil Engineers' Technical Catalogue. It provides a convenient source of reference for information on building materials, constructional methods and equipment of buildings. A new main section entitled 'Progress and Development' has been added, the indexing system has been considerably improved, and in general the contents are more easily accessible than in the previous issue.

Principles of Quantity Surveying, by *R. D. Wood*. $8\frac{1}{2}$ in. xiii + 630 pp. + folding pls. text illus. Estates Gazette. 1948. £1 17*s*. 6*d*.
The author, who is senior lecturer and examiner in Quantity Surveying at the Polytechnic, contends that there is a need for a text-book limited to a simple and comprehensive explanation of the method of 'taking off', followed by a series of graduated examples for students' practice. This volume, based on the 4th edition of the *Standard Method of Measurement*, published in January 1948, has been written to alleviate the situation, and it is clear that immense patience and labour have been expended in its preparation. Lecturers as well as students have reason to be grateful to Mr. Wood.

Windmills in England. A study of their origin, development and future, by *Rex Wailes*. 11 in. × $8\frac{1}{2}$ in. viii + 48 pp. text illus. Architectural Press. 1948. 12*s*. 6*d*.
Windmills make their appeal in varying ways to various people, though there are few who do not notice them. To some it is a romantic appeal, recalling happy country days, and wide skies punctuated by the twirling sails: landscapes of old England, the England of horses ploughing and tall hedges: the England threatened by factory-method agriculture with wire fences, combine harvesters and electric pylons.

To some they are mere obsolete pieces of machinery, untidily littering what should be efficient fields. Between these stands the conservative engineer and craftsman, who sees in the mills the continuity of British skill, the tradition of well making, and of ever modifying the technique to get better results: the best and most adaptable of the British tradition.

It is this that permanently arouses interest, and it is this interest that Mr. Rex Wailes admirably stimulates and satisfies. He has the engineering knowledge and he has skill in explaining: above all, he has appreciation of the human side, of keeping this machinery in order and responsive to the most variable motive power. How admirably his descriptions would have been set off by the sensitive and brilliant drawings of his friend Thomas Hennell, whose tragic early death in the Far East alone prevented this happy collaboration and to whose memory the book is dedicated.

The Dutch, who have today a greater body of working windmills and millers, have found it worth while to make new sails of a quite different construction to overcome the friction of the heavy shafts and stones, just as the British millers of the early XIXth century revolutionized their mills to get smooth running out of the erratic English winds. Mr. Wailes does not ask the town planner to stay the hand of time and decree that the windmill shall be preserved: he knows that it can only live if it is made effective for its work: he urges practical help for millers in better insurance for repairs, though he acknowledges sadly that the time for this is almost past and ever since the last war very many mills have gone out of use.

Another few years and the old windmills may be vanished away or left only as derelict and decaying hulks or a few museum pieces: Mr. Wailes has produced a wonderful record just in time. H. C. HUGHES [*F*]

How Architecture is made, by *H. S. Goodhart-Rendel*. (Liverpool Univ.: Sidney Jones' lectures in art, 1945-46.) $7\frac{1}{4}$ in. (ii) + 123 pp. text illus. Archt. and Building News. 1947. 7*s*. 6*d*.
Not how *all* architecture is made, as the author is careful to warn us, not even how any architecture *must* be made. But even when these reservations are understood, what a courageously wide field to cover in four lectures. Inevitably the result, like a trolley of hors d'œuvres, is rich, varied but unsubstantial. Subjects like the planning of town-halls and the perils of using towers, church ritual and office layout, the design of embassies and labourers' cottages, the language of the orders and the meaning of the Golden Cut are briskly whipped up with Gallic cunning, served well spiced with wit . . . and then just as the reader starts to tuck in, the dish is whisked away and replaced by another. It is to the credit of the author that the legacy of this whirlwind meal is not indigestion but a whetted appetite. Needless to say it will not be all to everyone's taste—how insipid it would be if it were—but even when he is in his most provoking mood Mr. Goodhart-Rendel is always instructive. Like some Vitruvian White Knight he picks his way through the forest, armed against every emergency, both real and self-imposed, and even when upside down (as you remember the White Knight so often was) he speaks with a clear determined voice.

He has not been generously served by his publishers. The illustrations, so wittily chosen, are reproduced far too small, and his text is worthy of more handsome typographical treatment. But don't let these minor faults discourage you from undergoing that next best experience to hearing Mr. Goodhart-Rendel speak, that of reading what he writes. H. CASSON [*A*]

Architectural Practice and Procedure, &c., by *Hamilton H. Turner*. 4th ed. by *John H. Turner*. $8\frac{1}{2}$ in. xiii + 414 pp. text illus. Batsford. 1948. 18*s*.
The 4th edition, revised and amplified, of a concise reliable book that has justified its existence for nearly a quarter of a century. New features include a chapter on 'War Damage Repairs' and a 'Specification for Making Good War Damage' in a small house.

Drainage and Sanitation, &c., by *E. H. Blake*. 9th ed. by *W. R. Jenkins*. $7\frac{3}{4}$ in. xii + 564 pp. text illus. Batsford. 1948. 15*s*.
The 9th edition of a long-established text-book covering the whole subject in a compact and readable form and, surely sufficient evidence of its popularity, the 3rd edition since the end of the war. Recent developments, particularly in heating, water supply and sewage disposal have necessitated the re-writing of considerable parts of the book.

Quantities. A guide to the measurement and valuation, &c., by *Banister* and *H. P. Fletcher*. 12th ed. by *A. E. Baylis*. $8\frac{3}{4}$ in. xxii + 683 + (24) pp. + (27) folding pls. Batsford. 1947 [1948]. £1 10*s*.
The 12th edition of this standard work and the first to be published since 1939. To a large extent the volume has been recast in form, revised and re-written. There is a completely new chapter entitled 'Preliminaries, Works on Site and Spot Bills', obviously of particular importance at the present in view of the mass of pending reconstruction work. The latest 'Standard Method of Measurement (July 1948)' is included.

Planning the Neighbourhood. Standards for Healthful Housing. Sub-Committee on Environmental Standards. Report prepared by *Anatole A. Solow* and *Ann Copperman* for the American Public Health Association, Committee on the Hygiene of Housing. $10\frac{1}{2}$ in. xiii + 90 pp. Chicago: Public Administration Service. 1948. $2.50.
Here is the kind of handbook we should be producing in England now. The Committee on the Hygiene of Housing of the American Public Health Association have approached the subject of neighbourhood planning with the conviction that the primary objective of housing is *health*. 'That term includes not only sanitation and safety from physical hazards, but also those qualities of comfort and convenience and æsthetic satisfaction essential for emotional and social well-being' in neighbourhoods. In the light of these needs, certain criteria are suggested for the selection of sites and for their development. The object of the manual is to put forward principles and standards which the technician will use in the course of designing neighbourhood layout, and as a kind of yardstick against which the non-technical policymaker can test the soundness of solutions presented to him by the technician.

Neighbourhood size is based upon minimum and maximum size of schools within a $\frac{1}{2}$-mile walking distance.

In this slender volume is a mass of valuable information on such subjects as site selection, development of land, utilities and services, house types and densities, neighbourhood services and traffic circulation. Planners are guided by detailed tables on site areas of all kinds of neighbourhood community facilities, open spaces, shopping centres and school sites. In addition are tables setting forth access standards and the relationship of net dwelling densities and building coverage. The Appendices contain bibliography, glossary, an interesting schedule of potential sources of 'nuisances and hazards', and a useful list of organizations which may supply neighbourhood services.

This publication from America is certainly a book of reference that every English planner ought to have.

MAX LOCK [*A*]

Notes and Notices

Second General Meeting, Tuesday 14 December 1948 at 6 p.m.

The Second General Meeting of the Session 1948-49 will be held on Tuesday 14 December 1948 at 6 p.m. for the following purposes:

To read the minutes of the Inaugural General Meeting held on 9 November 1948; formally to admit new members attending for the first time since their election.

To announce the Council's nomination for the Royal Gold Medal 1949.

Sir Malcolm Trustram Eve, Bart., M.C., T.D., K.C., Chairman of the Central Land Board, to read a paper on *The Town and Country Planning Act and the Work of the Central Land Board.* (Light refreshments will be provided before the meeting.)

Cessation of Membership

Under the provisions of Bye-law 21 the following have ceased to be members of the R.I.B.A.:

As Licentiates. Cecil Richard Keal Codrington, Leonard Crowfoot, Godfrey George Harold Hardinge, Colin Holden Smith, Frederick Charles Stredder.

As Retired Licentiates. Thomas Percy Bell, Tom Burnley.

The R.I.B.A. London Architecture Bronze Medal 1948

The attention of members is drawn to the Form of Nomination and the conditions, subject to which the award will be made for a building built within a radius of eight miles from Charing Cross during the three years ending 31 December 1948, enclosed with this issue of the JOURNAL. Any member of the Royal Institute is at liberty to nominate any building for consideration by the jury.

The nomination forms should be returned to the Secretary, R.I.B.A. not later than 28 February 1949.

A.S.B. Lecture, 7 December 1948

Full Scale Trials on House Heating Systems, by Richard Eve, B.Arch. [*A*].

This meeting will discuss the first report on the Full Scale Trials on House Heating Systems undertaken by the Building Research Station, which appears in this issue of the JOURNAL.

It will open with a film called 'Heating Research in Houses' made by the Crown Film Unit, to explain the purposes of the experiment and the methods employed to obtain the answers. Following the film a talk by Mr. Eve will be given, elaborating the published data which are concerned with the economics of the various heating systems incorporated in the trials.

Licentiates and the Fellowship

By a resolution of the Council passed on 4 April 1938 on and after 1 January 1939 all candidates whose work is approved are required to sit for the Examination, which will be the design portion of the Special Final Examination, and no candidates will be exempted from the examination.

Note.—The above resolution does not affect Licentiates of over 60 years of age applying under Section IV, Clause 4 (*c*) (ii) of the Supplemental Charter of 1925.

British Architects' Conference, Nottingham, 29 June -2 July 1949

The next Annual Conference of the R.I.B.A. and its Allied and Associated Societies will take place at Nottingham from 29 June to 2 July 1949.

Members and Professional Affixes

The Council's attention has been called more than once to the practice, among some members, of adding a string of letters of doubtful value to the affix indicating membership of the Royal Institute on their letter paper.

This is a matter in which the Council obviously cannot dictate to members, and must trust to their good sense. It should be obvious, however, that the affix of a chartered body of high standing is weakened in effect by the addition to it of a string of other mysterious designations some of which probably indicate no more than the payment of an annual subscription.

BOARD OF ARCHITECTURAL EDUCATION

R.I.B.A. Intermediate Examination. Salisbury, Southern Rhodesia, May 1948

Mr. Arthur S. Annett passed the R.I.B.A. Intermediate Examination (subject to approval of Theses) held in Salisbury, Southern Rhodesia, in May 1948.

R.I.B.A. Diploma in Town Planning

Mr. Richard Holtby [*A*] having passed the qualifying Examination, has been awarded the R.I.B.A. Diploma in Town Planning.

R.I.B.A. Final and Special Final Examinations, July 1948

The R.I.B.A. Final and Special Final Examinations were held in Southern Rhodesia, New Zealand, Kenya, Malaya and Canada in July 1948. The successful candidates are as follows: *Final Examination:* Mr. Graham F. Fox (Auckland). *Special Final Examination:* Mr. Roy C. Brown (Salisbury), Mr. Ralph Marlow (Fiji), Mr. Henry D. Quelch (Salisbury).

ALLIED SOCIETIES

Changes of Officers and Addresses

Bristol Society of Architects. Hon. Secretary, Mr. Albert H. Clarke [*A*]. New address: 'Brae', Over Road, Almondsbury, near Bristol. (Almondsbury 3145.)

The Hampshire and Isle of Wight Architectural Association, including the Channel Isles. Secretary, Mrs. D. Benham, address as before, 39 Portland Terrace, Southampton.

Manchester Society of Architects, Burnley District Society of Architects. New address of President, Mr. Samuel Taylor [*F*] is 60 Manchester Road, Burnley. Secretary, Mr. Ernest Benn, St. James Hall Building, Burnley.

Nottingham, Derby and Lincoln Architectural Society Annual Dinner

At the annual dinner held on 22 October Mr. R. E. M. Coombes [*F*], President of the Society, said the Mayor of Nottingham (Councillor J. E. Mitchell), who unfortunately was unable to be present as he was attending another function, had offered the R.I.B.A. full facilities in the way of entertainment on behalf of the city for the British Architects' Conference in 1949.

Alderman L. W. A. White, proposing the toast of the evening, 'The R.I.B.A. and Allied Societies,' declared that there was no profession which offered such scope for the exercise of the liberal arts and sciences as architecture. Unfortunately, the present tendency was for the responsibility for building to get into fewer and fewer hands, which was a great handicap and hardship to the younger generation of architects.

Mr. A. B. Knapp-Fisher [*F*], Vice-President, R.I.B.A., the chief guest of the evening, described the present time as 'one of disappointment and frustration to the architect'. Although it was a time for serious consideration and action, it was nevertheless a time of challenge and opportunity. He looked forward to a great renaissance of English architecture. Now was the time to prepare people's minds for the days when architecture would come into its own again—a new golden age, in fact.

Mr. C. F. W. Haseldine [*F*], Vice-President of the Society, Mr. James Harrison, M.P., who prophesied that the period of austerity architecture was about to come to an end, and Dr. A. H. Briggs, of Lincoln, were other speakers. Other guests at the top table were Mr. C. D. Spragg (Secretary, R.I.B.A.), Mr. C. H. Aslin, [*F*] (Vice-President, R.I.B.A.) Mr. R. M. Finch, and Mr. J. Llewellyn Davies.

South Eastern Society of Architects—Canterbury Chapter

An informal general meeting of the Chapter was held on Tuesday 26 October, when Mr. Richard Henniker [*F*] opened a discussion on 'The Work of the R.I.B.A.' Mr. Henniker commented on the recent articles in the JOURNAL on this subject, and the discussion ranged over many questions, including the control of entry to the Institute and to the Register and the relations of the profession with the press and with the government of the day. About 50 members and friends were present, and the interest shown was very considerable.

R.I.B.A. Architecture Bronze Medal. Birmingham and Five Counties Architectural Association Area

The award of the R.I.B.A. Bronze Medal made by the Birmingham and Five Counties Architectural Association to Mr. Robert Atkinson [*F*] for the Barber Institute of Fine Arts was marked by a Presentation Ceremony, which took place at the Barber Institute on Thursday 11 November. The presentation was made by the Birmingham and Five Counties Association's President, Mr. F. J. Osborne, M.C. [*F*], supported by a gathering of members of the Association. Before the actual presentation the party inspected the building, and the presentation was followed by a speech by Mr. C. D. Medley, Chairman of the Trustees of the Barber Institute.

South Eastern Society of Architects Students' Competitions, Exhibition and Prize-Giving at the R.I.B.A., 28 October 1948

The President of the S.E.S.A., Mr. Arthur J. Stedman [*F*], was in the Chair at the R.I.B.A.; about 200 students, members of the Society and guests were assembled.

Mr. Stedman said that this was a notable occasion for the Society since it was the first time such a gathering had been held. The high standard of the work on view reflected much credit on the students and on the schools, most of them not yet recognized for exemption from the Institute's examinations, and it was an excellent thing that it should be exhibited for all to see. This had been made possible by the generosity of the Institute which had allowed the use of its rooms for the jurying, the exhibition and the present meeting.

Mr. Stedman introduced Mr. S. Rowland Pierce, Dist.T.P. [*F*] to give the criticism. As a Rome scholar and the winner of many competitions himself, Mr. Pierce, he said, was well qualified to pass judgment.

Mr. Pierce dealt with the prize-winning work which comprised Measured Drawing, Design and Sketches, and sets of Examination Testimonies. He stressed the value of Measured Drawing not merely for its training in draughts-

manship and survey but as an indispensable means of getting to know something of the attitude of mind which produced the work upon which that of the present is founded. Of the Design he said that on the whole the Junior work was superior to the Senior since it showed greater evidence that the programme had been fully considered and digested. He drew attention particularly to the need to assess fundamentals at the very beginning and to try alternative solutions. He recommended the value of sketching in a diversity of media and particularly in colour which helped to develop an awareness of the nature and character of the forms and materials in which an architect works.

The President, R.I.B.A., Mr. Michael Waterhouse, M.C. [*F*], presented the prizes.

The Prizewinners were as follows:

Senior Design: A Rowing Club: 1st Prize, 8 gns. Mr. S. Dray, Canterbury. *2nd Prize, 4 gns.* Mr. C. E. Wright, Canterbury.

Junior Design: A Warden's Office for a National Park: 1st Prize, 3 gns. Mr. B. Webb, Rochester. *2nd tie, 1 gn.* Mr. M. J. Blee, Brighton. *2nd tie, 1 gn.* Mr. J. H. Bennett, Guildford.

Senior Measured Drawing: 1st Prize, 4 gns. Mr. J. S. Foster, Canterbury. *2nd Prize, 2 gns.* Mr. P. Brown, Canterbury.

Junior Measured Drawing: 1st Prize, 3 gns. Mr. A. C. Watts, Rochester. *2nd Prize, 1 gn.* Mr. I. Beresford Rochester. *2nd Prize (additional), 1 gn.* Mr. P. Vallis, Rochester.

Inter Testimonies Prize: 5 gns. Mr. D. Vane, Canterbury.

Finals Testimony Prize: 8 gns. Mr. C. E. Wright, Canterbury.

Sketching Prize: 3 gns. Mr. S. Dray, Canterbury.

GENERAL NOTES

Commonwealth Fund Fellowships

The Commonwealth Fund of New York offers annually to graduates of British Universities 20 Fellowships tenable for one year in the graduate schools of certain Universities in the United States of America. These Fellowships are open to men and women.

Each Fellowship includes adequate provision for tuition and living expenses with ample allowances for ocean passage and travel in the United States during vacations.

Graduates of British descent and under 35 who can produce evidence of proficiency in some recognized branch of University learning are eligible.

Applications for Fellowships tenable in 1949-1950 will be received until 1 February 1949.

Forms of application and other information may be obtained from the Secretary of the Commonwealth Fund Fellowships, 35 Portman Square, London, W.1.

London County Council

The three districts, East, South and West Westminster have been amalgamated into one District of Westminster, the District Surveyor being Mr. L. A. D. Shiner [*F*], with offices at 25 Cockspur Street, London, S.W.1.

R.I.B.A. Golfing Society

The last meeting of the R.I.B.A. Golfing Society for the current season was held at Sudbury Golf Club on Wednesday 20 October.

The results were: The Selby Cup and Spoon won by G. F. Wilson, with a score of 81—5=76. Runners-up: A. H. Walker, 82—5=77; W. R. F. Fisher, 86—9=77. F. T. Smith, 90—13=77.

The afternoon four-ball bogey competition was won by: A. D. McGill and E. H. Firmin with a score of 2 up.

Notes from the Minutes of the Council

MEETING HELD 19 OCTOBER 1948

Membership of Council: The President announced with regret that Mr. W. Dobson Chapman [*L*] had resigned from membership of the Council and the Town and Country Planning Committee on the grounds of ill-health.

By a unanimous resolution of the Council the Secretary was instructed to convey to Mr. Dobson Chapman their appreciation of his work for the Institute and good wishes for a quick recovery.

R.I.B.A. Distinction in Town Planning: The Council have conferred the award of the R.I.B.A. Distinction in Town Planning on the following: Professor Sir Patrick Abercrombie [*F*], Professor W. G. Holford [*A*], Major T. F. Thomson [*L*], Mr. O. Weerasinghe [*F*].

R.I.B.A. Diploma in Town Planning: The Council have awarded the R.I.B.A. Diploma in Town Planning to Mr. Richard Holtby [*A*].

Appointments

(A) National Consultative Council of the Building and Civil Engineering Industries: R.I.B.A. Representatives for Year ending 1 July 1949: Mr. Michael Waterhouse (President), and Mr. T. Cecil Howitt [*F*] (re-appointed).

(B) Architects' Registration Council of the United Kingdom: R.I.B.A. Representative: Mr. Denis Poulton [*F*] in place of Mr. Michael Waterhouse (President).

(C) National Certificates and Diplomas in Building: R.I.B.A. Representative on Joint Committee in Scotland responsible for Awards: Mr. W. H. Kininmonth [*F*].

(D) Codes of Practice Committee convened by Institution of Municipal Engineers on Sewage Disposal: R.I.B.A. Representative: Mr. B. W. Stuttle [*F*] in place of Mr. T. E. North [*F*].

(E) Cement Economy Committee, Ministry of Works: R.I.B.A. Representatives: (i) Sub-Committee on Housing and Small Scale Buildings: Mr. E. D. Mills [*F*]; (ii) Sub-Committee on Engineering and Large Scale Buildings: Mr. J. Alan Slater [*F*].

(F) B.S.I. Committee FHB/1—General Purpose Farm Buildings: Mr. C. J. Epril [*F*].

(G) British National Committee on Building Documentation: R.I.B.A. Representatives: Mr. R. E. Enthoven [*F*]; Mr. H. V. M. Roberts, of the R.I.B.A. Library Staff.

Working Party on the Building Industry: The following have been appointed to serve on the R.I.B.A. committee to prepare evidence to be submitted by the Institute: Mr. T. Cecil Howitt [*F*], Chairman, Mr. D. H. McMorran [*F*], Mr. R. H. Matthew [*A*], Mr. Andrew Rankine [*A*], Mr. Charles Whitby [*F*].

Christmas Holiday Lectures for Boys and Girls: Mr. Peter Shepheard [*A*] has been invited to give these lectures during the Christmas holiday 1948, and has accepted the Council's invitation.

The late Sir Walter Tapper, K.C.V.O. (Past President): The Council have accepted with appreciation the gift of the insignia of the K.C.V.O., awarded to the late Sir Walter Tapper (Past President), presented by Mr. Michael Tapper [*F*].

Reception 1949: The Council have approved a proposal to hold a reception at the Institute on Friday 29 April 1949.

Post-War Hospital Building Committee: The Council approved a recommendation to reconstitute the R.I.B.A. Post-War Hospital Building Committee with the following revised terms of reference:

(A) To investigate the present position in regard to planning for hospital building.

(B) To enquire what schemes for development are under consideration.

(C) To collect information as to the appointment of architects to Regional Hospital Boards, and their duties and functions and whether architectural staffs are being formed.

(D) To examine generally the position of private architects who were previously, or are still working for hospitals.

Bequest: Hartley Hogarth Scholarship: Under the will of the late Mrs. Ethel Heaps a sum of money has been left to the Institute, the income from which is to be devoted to grants towards the fees for architectural study at any university or school of architecture to any student or students who shall have been resident in the Borough of Keighley for a period of ten years prior to the making of such grants.

The Council have referred the matter to the Board of Architectural Education to draw up a procedure for carrying out the terms of the trust.

Institution of Municipal Engineers: Grant of Royal Charter of Incorporation: By resolution of the Council the congratulations of the Institute on the grant of a Royal Charter have been conveyed to the Institution of Municipal Engineers.

Société Royale des Architectes d'Anvers: The Secretary reported that through the courtesy of H.M. Ambassador in Brussels arrangements had been made for the Institute to be represented by a member of the Embassy staff at the centenary celebrations of the Société Royale des Architectes d'Anvers held in Antwerp on 20 September 1948.

Membership: The following members were elected: as Honorary Associate, 1; as Honorary Corresponding Member, 1; as Fellows, 16; as Associates, 66; as Licentiates, 7. Students: 262 Probationers were elected as Students.

Applications for Election: Applications for election were approved as follows: *Election 14 December* 1948: as Honorary Fellows, 2; as Honorary Associates, 2; as Honorary Corresponding Members, 17; as Fellows, 13; as Associates, 406; as Licentiates, 16. *Election 8 March* 1949 (*Overseas Candidates*): as Associates, 14.

Applications for Reinstatement: The following applications were approved: as Associates: Stephen Paul Hewitt, John Frank Schofield.

Resignations: The following resignations were accepted with regret: Gordon Samuel Keesing [*F*], Robert Martin [*F*], Samuel Chesney [*A*], Archibald Oliphant Hamilton [*A*], George Hudswell Ineson [*A*], Patrick Joseph Scally [*A*], Hywel Scott Davies [*L*], Arthur Gore Edwards [*L*], George Gladstone Lynes [*Retd. L*].

Applications for Transfer to Retired Members' Class under Bye-law 15: The following applications were approved: as Retired Fellows: Alfred H. Chapman, John Wilson; as Retired Associates: Pherozshah Fardoonji Balsara, Shirley Harrison; as Retired Licentiate: William Comley Roles.

Review of Films—7

The country of origin and date of release are given first. The film is in monochrome unless otherwise stated. The sizes (35 *mm. and* 16 *mm.*) *are given. Sound films are marked 'sd.', and silent 'st.' The running time is given in minutes.* (*F*) *indicates free distribution.* (*H*) *indicates that a hiring fee is payable.*

Britain Can Make It: No. 11

Britain 1946 (*F*)

(i) Making an ordnance survey map.

(ii) Brickmaking for rebuilding Britain.

Summary. (i) A short account of the method used for making an ordnance survey map. Prior to a few years ago, maps were still based on surveys made by the Royal Engineers 150 years ago. By dividing the country into triangles a complete network of known points—a mile apart—is built up, and from these points a detailed survey is conducted.

(ii) The need for greater supplies of bricks. Brick kilns fall into disuse if not used continuously. Methods of excavating clay, bricks being made by hand as well as by machine, shots of some of the processes involved. Brick works have to be situated where clay is available. Some modern brick works are virtually small towns, providing pleasant living conditions and amenities for their employees.

Appraisal. (i) A film which hardly comes within the scope of this Committee, but one which could be seen with profit by all those interested in one or other form of planning. A concise and excellent little film which deals with the subject in a clear and straightforward manner.

(ii) A well thought out film which covers the ground in an efficient manner laying stress on some of the most important points while avoiding too much detail.

35 sd. 16 sd. 10 minutes. Central Film Library, Imperial Institute, S.W.7. (Reference U.K. 831.)

The Tarran Newland House

Britain 1947 (*F*)

Summary. The film demonstrates the speed at which a prefabricated house can be erected, and the methods employed, including the construction of the roof at the earliest possible stage. Reference is made to other types of Tarran houses and their advantages over traditional methods of construction.

Appraisal. A straightforward account of the erection of a particular type of prefabricated house, with many good shots of the principal operations involved and an informative commentary.

16 sd. 13 minutes. Tarran Industries Ltd., 7 Warwick House Street, Cockspur Street, S.W.1.

Houses in History

Britain 1946 (*F*). With teaching notes.

Summary. A survey of the types of house lived in by our ancestors up to the present day. Demonstrates that the way a house is built is governed in part by the materials available, i.e. timber, stone, bricks, etc., and also by the prevailing social conditions. In the Middle Ages the Barons and Lords of the Manor built castles and fortified manors to keep the invaders out, while the best workmanship was put into building churches. With the coming of more civilized times, a more gracious architecture was developed, reaching a high standard in the 17th and 18th centuries. The influence on English Architecture of the Classical and Renaissance forms is shown, and comparisons are drawn with the low standard of housing prevalent during and after the first World War. Examples of present-day houses show how architects are endeavouring to relate their buildings to natural surroundings, paying special attention to orientation, sunlight, etc.

Appraisal. In many respects a well thought out film, although it attempts to cover too wide a field in a short time. The commentary is interesting and informative, though the introduction of musical sequences is apt to be confusing. The photography is on the whole good, but there are too many unimportant close up angle shots, shots of detail where a general view would give a better impression of the period under discussion. The film gives in a competent way a general survey which is suitable for younger children and lay public who do not want too much detail.

35 sd. 16 sd. 19 minutes. Can be hired from the Central Film Library, Imperial Institute, London, S.W.7. (Reference No. U.K. 762.)

Membership Lists

ELECTION: 19 OCTOBER 1948

The following candidates for membership were elected on 19 October 1948:

AS HON. ASSOCIATE (1)

Dwelly: The Very Rev. Frederick William, M.A., D.D., Liverpool.

AS HON. CORRESPONDING MEMBER (1)

Orr: Douglas William, New Haven, Connecticut.

AS FELLOWS (16)

Bullen: Alfred Gabriel [*A* 1935], Liverpool.
Bunney: Michael John Hewetson, M.A.(Oxon), A.A.Dip.(Hons.) [*A* 1935], Norwich.
Holford: Prof. William Graham, M.A.,M.T.P.I. [*A* 1932].
Mayorcas: Elie [*A* 1933].
Morgan: Richard George, M.C., F.R.I.C.S., Dip.T.P. [*A* 1928], Salford.
Needham: John, Dip.Arch. (Leeds), R.I.B.A. Alfred Bossom Silver Medallist 1937, R.I.B.A. Alfred Bossom Gold Medallist 1938, Soane Medallist 1938 [*A* 1931], Dundee.
Ng: Keng Siang [*A* 1936], Singapore.
Nightingale: Paul Forster [*A* 1939].
Parkin: John Burnet, B.Arch. (Toronto) [*A* 1938], Toronto.
Stainsby: George Pawson [*A* 1919], Stockton-on-Tees.
Tait: Gordon Thomas [*A* 1939].
Taylor: Lt.-Col. John Percival, M.B.E. [*A* 1937], Hull.

and the following Licentiates who have passed the qualifying examination:

Clunie: William Lambie, Sheffield.
Green: Norman.
Pettengell: Edward Eric.

and the following Licentiate who is qualified under Section IV, Clause 4 (*c*) (ii), of the Supplemental Charter of 1925:

Chippindale: Benjamin, Bradford.

AS ASSOCIATES (66)

Balfour-Paul: Lyon, Tynehead, Midlothian.
Bennett: Philip Hugh Penberthy, M.A.
Bhogle: Manohar Gopalrao, Bombay.
Brashier: Michael Hugh.
Brewster: Kenneth Arthur, Norwich.
Brown: Dennis Herbert.
Cooper: Audrey Christine (Miss).
Dale: George Leslie, Epping.
Eves: Kathleen Mary Heath (Miss).
Farebrother: Arthur Francis, B.A., Hons. Arch., Ringway, Cheshire.
Feit: Werner, Salisbury, Southern Rhodesia.
Fowler: Ronald Keith, Eastbourne.
Frost: Fergus Howard, Bristol.
Gardner: Edward Antony.
Gillett: Ralph Percival Henry.
Gordon: Patrick John Vincent, Chislehurst.
Gow: Keith Ewart, Durban.
Gurling: Reginald Percy Howard, Taunton.
Harvey: Robert William, Nuneaton.
Haynes: Hedley Stuart, Yeovil.
Hogbin: Peter Richard, Waterville, Kerry, Ireland.
Holden: George Francis, Preston.
Holmes: Jillian Elizabeth (Miss).
Iredell: John Charles Lesingham, Sutton, Surrey.
Jolly: Ernest William, Norwich.
Laird: Colin, Southend-on-Sea.
Leach: Basil Frank, Eastbourne.
Le Briero: Theodore Paul Lucien, Leicester.
Leighton: William Thomas, Perth, Western Australia.
Lennon: David Reuben, Sydney, N.S.W.
Lewis: Wilfred Stephen.
Lipski: Louis, A.A. Dip.
Lockyer: Raymond.
Ludlow: Basil Godfrey, B.Arch. (Toronto), Toronto.
Martin: William Alexander.
Michaels: Leonard, M.A. (Cantab).
Newman: Frederick Hugh, Wellington, N.Z.
Nosworthy: Ellice Maud (Miss), B.Arch., Lindfield, N.S.W.
Paterson: John William, Kingston-upon-Thames.
Pearce: John Ricardo.
Phillips: Sheila Mary (Miss).
Pianca: Reginald.
Quickenden: Anthony Maurice.
Ralph: James Emerson, M.C.
Redmond: John Bice, Canberra A.C.T., Australia.
Rosner: Rolf.
Rowland: Edward Bernard, Salisbury, Southern Rhodesia.
Russell: Maurice Hawthorn, M.C., Bromley, Kent.
Scott, Kenneth Mackenzie, M.C., Hove.
Searl: Henry Desmond, Queensland, Australia.
Shenstone: Gerald Guy, Leigh-on-Sea.
Simpson: John Edwin, Sunderland.
Solomon: Philip, Manchester.
Sydenham: Barbara Jean (Miss), Woking.
Tait: Brian Sharland, Killara, N.S.W.
Tomlinson: Sydney Thomas, Exeter.
Tregoning: Vivian Angwin, Torquay.
Tribe: Betty Anne (Mrs.).
Tribich: Abraham Maurice.
Turner: Kenneth, Dip. Arch. (Leeds), Batley, Yorks.
Walker: Colin, Heckmondwike.
Wallace: MacLeod Somerville, West Wittering.
Ward: Alwyn Frederick, Oxford.
Webster: Guy Everard, Binstead, I.o.W.
Williams: Herbert John.
Winstanley: Mary (Miss), B. Arch.

AS LICENTIATES (7)

Bull: Hubert Henry.
Colgrave: Arnold Edward, Sheffield.
Elliott: George.
Evans: Ernest John.
Green: Albert John Russell, West Bromwich.
Horsman: William John Llewellyn, Epsom.
Linford: Albert Louis, Tamworth.

ELECTION: 14 DECEMBER 1948

An election of candidates for membership will take place on 14 December 1948. The names and addresses of the candidates, with the names of their proposers, found by the Council to be eligible and qualified in accordance with the Charter and Bye-laws, are herewith published for the information of members. Notice of any objection or any other communication respecting them must be sent to the Secretary, R.I.B.A., not later than Saturday 11 December 1948.

The names following the applicant's address are those of his proposers.

AS HON. FELLOWS (2)

Ilchester: The Earl of, 14 Montagu Square, W.1. Proposed by the Council.

Samuel: The Right Hon. Viscount, G.C.B., G.B.E., 32 Porchester Terrace, W.2. Proposed by the Council.

AS HON. ASSOCIATES (2)

Lancaster: Osbert, 10 Addison Crescent, W.14. Proposed by the Council.

Sitwell: Sacheverell, Weston Hall, Towcester, Northamptonshire. Proposed by the Council.

AS HON. CORRESPONDING MEMBERS (17)

Burckhardt: Ernst F., Fraumünsterstrasse 19, Zurich 1; Gartenstrasse 18, Küsnacht/Zch. Proposed by the Council.

Delano: Wm. Adams, M.A. (Yale), Officier Légion d'Honneur; 131 East 36th Street, New York 16, N.Y., U.S.A. Proposed by the Council.

Eliassen: Georg, Radhusgt 21, Oslo, Norway. Proposed by the Council.

Eriksson: Nils Einar, Brodragatan 38, Göteborg, Sweden. Proposed by the Council.

Fisker: Kay, Professor, Royal Academy of Art, Copenhagen: Kongens Nytorv, Copenhagen, K, Denmark. Proposed by the Council.

Hedqvist: Paul Gunnar, Professor, Arsenalsgatan 4, Stockholm, Sweden. Proposed by the Council.

Lind: Sven Ivar Harald, Professor and Head of the School of Architecture of the Royal Academy of Fine Arts, Stockholm; Kevingestrand 4, Stocksund, Sweden. Proposed by the Council.

Lund: Frederik Christian, City Architect of the Town of Copenhagen, Drosselvej 28, Copenhagen F, Denmark. Proposed by the Council.

Lurcat: Andre, Chief Architect for Reconstruction, 23 Rue Emile Durkheim, Chatenay Malabry, Seine, France. Proposed by the Council.

Michelucci: Giovanni, Professor, Viale Galileo 2, Firenze, Italy. Proposed by the Council.

Monteiro: Porfirio Pardal, Professor of the Technical University of Lisbon, Largo do Directorio 4, 2 D, Lisbon, Portugal. Proposed by the Council.

Neutra: Richard J., 2,300 Silverlake Boulevard, Los Angeles 26, California, U.S.A. Proposed by the Council.

Roth: Alfred, Hadlaubstrasse 59, Zurich 6, Switzerland. Proposed by the Council.

Samona: Giuseppe, Professor and Director for Architecture, University of Venice; Via Alpi 10, Rome, Italy. Proposed by the Council.

Sundahl: Eskil, Professor, Architect of the Swedish Co-operative Wholesale Society; Master Mikaelsgatan 6, Stockholm, Sweden. Proposed by the Council.

Van der Rohe: Ludwig Mies, Professor, Director of the Department of Architecture at the Illinois Institute of Technology, 200 East Pearson Street, Chicago II, Illinois, U.S.A. Proposed by the Council.

William-Olsson: Carl Martin Tage, Raketgatan 11, Goteborg, Sweden. Proposed by the Council.

AS FELLOWS (13)

Kendall: Henry, O.B.E., M.T.P.I. [*A* 1928], 17 Old Deer Park Gardens, Richmond, Surrey. Prof. A. E. Richardson, Prof. H. O. Corfiato, A. St. B. Harrison.

McLaren: Ian Hastings [*A* 1929], Wardrobe Chambers, 146a Queen Victoria Street, E.C.4; 6 The Broadway, Wimbledon, S.W.19; 14 Lansdowne Road, S.W.20. Harold Baily, H. Lidbetter, L. A. Chackett.

McMullen: Alexander Lawrence, M.A.(Cantab) [*A* 1930], 23 Berkeley Square, Bristol, 8; Garden Cottage, Bathampton, near Bath, Somerset. Howard Robertson, J. M. Easton, E. H. Button.

Peake: Brian, A.A.Dip. (Hons.) [*A* 1938], 13 Dover Street, W.1; 34 Lowndes Street, S.W.1. Howard Robertson, J. H. Forshaw, Fredk. Gibberd.

Ross: Eric Louis Genge [*A* 1939], The Bristol Aeroplane Co., Ltd., Filton House, Bristol; 11 Cranleigh Gardens, Stoke Bishop, Bristol 9. Lt.-Col. R. F. Gutteridge, J. N. Meredith, D. du R. Aberdeen.

Underhill: Alfred [*A* 1931], Oswald P. Milne, Esq. [*F*], 103 South End Road, N.W.3; 54 Whitmore Gardens, N.W.10. O. P. Milne, H. D. Sugden, C. M. Swannell.

Wolff: William Eugen [*A* 1934], 81 Fleet Street, Torquay; The Laurels, Babbacombe Road, Torquay. G. S. Bridgman, Herbert Kenchington, W. N. Couldrey.

and the following Licentiates who have passed the qualifying Examination:

Clark: Herbert Anthony, 1 Grosvenor Road, Wrexham; Hillberry, Horsley Road, Gresford, Denbighshire. F. M. Kirby, F. S. Swash, F. C. Saxon.

Farmer: Sidney Albert, 185 Queen Edith's Way, Cambridge; 3 Queen Annes Grove, Bedford Park, W.4. H. E. Matthews, C. B. Metcalfe, H. W. Burchett.

Jolly: George James (Major), War Office, Whitehall, S.W.1; 10 Chichester Close, Saltdean, Sussex. W. A. Ross, F. J. Searley, C. E. Culpin.

Konrad: Joseph, A.M.T.P.I., 196 Coltman Street, Hull. Edgar Farrar, Allanson Hick, M. H. Thomas.

Lindy: Kenneth John, 24 St. Mary Axe, E.C.3; Feltham House, Goldings Hill, Loughton, Essex. R. W. Stoddart, F. G. A. Hall, L. M. Gotch.

Moro: Peter, 32 Crooms Hill, Greenwich, S.E.10. E. C. Scherrer, Bertram Carter, E. M. Fry.

AS ASSOCIATES (406)

The name of a school, or schools, after a candidate's name indicates the passing of a recognized course.

Ackland: James Bryant [Final], 2 Downleaze, Stoke Bishop, Bristol 9. G. D. G. Hake, E. H. Button, T. H. B. Burrough.

Adams: Ralph Whatmoor, Dip.Arch (Leeds) (Leeds Sch. of Arch.), Castle Hill House, Kingsley, nr. Frodsham, Warrington. G. H. Foggitt, N. R. Paxton, Victor Bain.

Aitken: Allan, Dip.Arch. (Aberdeen) (Aberdeen Sch. of Arch.: Robert Gordon's Tech. Coll.), 82 Ashgrove Road West, Aberdeen. E. F. Davies, J. B. Nicol, G. A. Mitchell.

Alderson: Frederick, Dip.Arch (Durham) (King's Coll. (Univ. of Durham), Newcastle-upon-Tyne, Sch. of Arch.), 'Hillside,' Thorpe Road, Easington, Co. Durham. Prof. W. B. Edwards, R. N. MacKellar, J. H. Napper.

Alderson: Geoffrey Stuart (Victoria Univ., Manchester: Sch. of Arch.), 24 Manchester Road, Chorlton, Manchester. Prof. R. A. Cordingley, J. S. Beaumont, F. L. Halliday.

Allan: Frank (Edinburgh Coll. of Art: Sch. of Arch.), 13 Lennox Street, Edinburgh. A. H. Mottram, Sir Frank Mears, W. H. Kininmonth.

Allan: Robert, Dip.Arch. (Glasgow) (Glasgow Sch. of Arch.), 2 Manor Place, Dewsbury, Yorks. W. I. Thomson, Hubert Bennett, Prof. W. J. Smith.

Allerton: Kenneth [Final], 13 Crosby Road, West Bridgford, Nottinghamshire. E. W. Roberts, E. Frear, F. A. Broadhead.

Attwater: Donald David (Liverpool Sch. of Arch.: Univ. of Liverpool), 1 Eastgate, Fulwood, Preston. Prof. L. B. Budden, D. Brooke, F. X. Velarde.

Ayton: Francis Herbert (King's Coll. (Univ. of Durham), Newcastle-upon-Tyne, Sch.of Arch.), 6 The Close, West Denton, Newcastle-on-Tyne, 5. Prof. W. B. Edwards, Edmund Oakley, W. W. Tasker.

Baikie: John Edgar Alexander (Edinburgh Coll. of Art: Sch. of Arch.), 'Holmlands,' Crawford, Lanarks. Leslie Grahame-Thomson, A. H. Mottram, James Shearer.

Bailey: Brian (Birmingham Sch. of Arch.), 134 Haunch Lane, Birmingham, 14. George Drysdale, C. E. M. Fillmore, A. R. Young.

Baker: Alfred Patrick Edmeades (Bartlett Sch. of Arch. Univ. of London), Yeomans House, Sole Street, nr. Gravesend, Kent. A. T. Scott, Frankland Dark, F. Q. Farmer.

Bance: Roy Ernest Keith [Final], 23 Sunbury Court Road, Sunbury-on-Thames, Middx. Louis de Soissons, L. G. Pearson, and applying for nomination by the Council under Bye-law 3 (*d*).

Barker: John Clifford (Leeds Sch. of Arch.), 158 Belmont Terrace, Heckmondwike Road, Dewsbury. The President and Hon. Sec. of the West Yorks Soc. of Archs. under Bye-law 3 (*a*), and applying for nomination by the Council under Bye-law 3 (*d*).

Barnes: Frederick Richard [Special Final], 126 Uxbridge Road, Hampton, Middlesex. H. S. Gardiner, N. L. Reece, C. W. Box.

Barr: Albert William Cleeve (Northern Poly. (London): Dept. of Arch.), 49 Brookland Rise, N.W.11. C. H. Aslin, Dr. Charles Holden, Gordon Stephenson.

Barrett: Peter Rhodes, Dip.Arch. (L'pool) (Liverpool Sch. of Arch: Univ. of Liverpool), 10 Keighley Road, Colne, Lancs. Prof. L. B. Budden, D. Brooke, F. X. Velarde.

Bates: Jack [Final], 27 Arden Crescent, North Fenham, Newcastle-upon-Tyne, 5. F. Chippindale, S. Penn Smith, G. A. Cope.

Baxter: Kenneth Martin [Final], 27 Church Street, Atherton, Manchester. G. N. Hill, U. A. Coates, Ernest Prestwich.

Bean: Norman Stewart (Univ. of Sheffield: Dept. of Arch.), 126 Park Avenue, Hull, Yorks. Prof. Stephen Welsh, H. B. Leighton, H. B. S. Gibbs.

Beard: Geoffrey John [Final], 26 Kingsley Avenue, West Ealing, W.13. E. M. Rice, Edgar Farrar, T. L. Dale.

Belchamber: John [Special Final], 59 Ringwood Crescent, Wollaton Road, Nottingham. George Checkley, E. W. Roberts, E. Frear.

Bennis: David [Final], 28 Holmes Avenue, Hove 4, Sussex. J. L. Denman, S. H. Tiltman, F. [illegible] Howard.

Benson: Alan Warburton (Leeds Sch. of Arch.), 1 Roman Mount, Roundhay, Leeds, 8. N. R. Paxton, W. F. Dawson, G. H. Foggitt.

Bercott: Baron, B.Arch. (L'pool) (Liverpool Sch. of Arch.: Univ. of Liverpool), 21 Ivanhoe Road, Sefton Park, Liverpool, 17. Prof. L. B. Budden, D. Brooke, H. A. Dod.

Bickford: Reginald Joseph [Special Final], 'Killanagh,' Grange Park, Dean's Grange, Co. Dublin. C. W. Box, the late H. G. Simms, J. J. Robinson.

Blackburn: Alfred Norman, Dip.Arch. (Dist.) (Leeds) (Leeds Sch. of Arch.), 'Redbourne,' Thorncliffe Road, Batley, Yorks. The President and Hon. Sec. of the West Yorkshire Soc. of Archs. under Bye-law 3 (*a*), and applying for nomination by the Council under Bye-law 3 (d).

Blackwell: Harold William [Special Final], 1 Castle Park, Cavehill Road, Belfast, N. Ireland. T. R. Eager, Frank McArdle, J. H. Stevenson.

Blockley: John Patrick, M.C. (Arch. Assoc. (London): Sch. of Arch.), 4/341 Finchley Road, N.W.3. H. W. Hobbiss, A. R. F. Anderson, Frederick MacManus.

Borland: Marjorie Kirsteen (Miss), (Glasgow Sch. of Arch.), 43 Kirklee Road, Glasgow, W.2. E. G. Wylie, A. G. Henderson, W. Underwood.

Bosanquet: Peter Henry (Arch. Assoc. (London): Sch. of Arch.), Beechingstoke, Marlborough, Wilts. R. F. Jordan, R. E. Enthoven, T. S. Tait.

Bowen: Stewart Powell, Dip.Arch. (Mancr.) (Victoria Univ., Manchester: Sch. of Arch.), 4 Hesketh Avenue, Didsbury, Manchester 20. Prof. R. A. Cordingley, H. H. Smith, A. G. Chant.

Bowering: Frederick John [Final], 126 Old Dover Road, Canterbury, Kent. J. F. Howes, H. Anderson, H. C. Ashenden.

Boxell: Cyril Laurence [Special Final], 136 Western Road, Brighton, 1. K. E. Black, S. C. Garrett, S. H. Tiltman.

Bradley: Stanley, Dip. Arch. (Leeds) (Leeds, Sch. of Arch.), 12 Gawthorpe Avenue, Bingley, Yorks. Victor Bain, G. H. Foggitt, W. A. Jones.

Brand: Ian Thomas (Edinburgh Coll. of Art: Sch. of Arch.), 53 Forrester Road, Edinburgh, 12. W. I. Thomson, J. F. Matthew, A. H. Mottram.

Brazier: Norman Henry Frederick [Special Final], Eothen, Leighams Road, Bicknacre, Chelmsford. H. Conolly, Gordon O'Neill, E. P. Archer.

Broadbent: Winifred Joyce (Miss), B.A. (Hons. Arch) (Mancr.) (Victoria Univ., Manchester: Sch. of Arch.), 38 Undercliff Road, Lewisham, S.E.13. Prof. R. A. Cordingley, J. P. Nunn, F. L. Halliday.

Bromage: Frederick Wilfred Arthur [Final], 20 Etnam Street, Leominster, Herefordshire. Applying for nomination by the Council under Bye-law 3 (*d*).

Brooke: Jennifer (Miss) (Arch. Assoc. (London): Sch. of Arch.), 3 Cromwell Place, South Kensington, S.W.7. George Fairweather, R. F. Jordan, Frederick MacManus.

Brown: James [Special Final], 214 New Street, Musselburgh, Midlothian. A. A. Foote, Basil Spence, A. H. Mottram.

Brown: William George (Aberdeen Sch. of Arch., Robert Gordon's Tech. Coll.), Clayforbie, Turriff, Aberdeenshire. W. L. Duncan, J. B. Nicol, G. A. Mitchell.

Brown: William Newman [Final], 3 Old Park Road, Palmers Green, N.13. H. B. Challen, J. T. W. Peat, T. E. Scott.

Buchanan: Alexander Murdoch, Dip.Arch. (Glasgow) (Glasgow Sch. of Arch.), 'Beachmore,' 70 St. Meddans Street, Troon, Ayrshire. Prof. W. J. Smith, William Cowie, J. A. Coia.

Burd: Evelyn (Miss) (Leeds Sch. of Arch.), 38 Heslington Lane, Fulford, York. Applying for nomination by the Council under Bye-law 3 (*d*).

Burford: Douglas William [Final], 'St. Mawes,' The Warren, Carshalton, Surrey. J. K. Hicks, E. C. Scherrer, H. A. Welch.

Buteux: Harold Ernest [Final], 19 Eastern Road, Wood Green, N.22. Baxter Greig, John Dovaston, J. S. Walkden.

Butters: John Charles (Northern Poly. (London): Dept. of Arch.), 156 St. John's Road, Ipswich. T. E. Scott, J. A. Sherman, Raymond Erith.

Buttle: Derek (Victoria Univ., Manchester: Sch. of Arch.), 20 Airmyn Avenue, Goole, W. Yorkshire. Prof. R. A. Cordingley, Dr. J. L. Martin, G. D. Harbron.

Caldwell: Barbara Jean (Miss) (Arch. Assoc. (London): Sch. of Arch.), Tenterden, Camberley, Surrey. R. F. Jordan, Frederick MacManus, A. R. F. Anderson.

Cane: John Ralston (Birmingham Sch. of Arch.), 33 Ellesboro Road, Birmingham, 17. George Drysdale, Reginald Edmonds, F. Potter.

Carruthers: Alan John, Dip.Arch. (Glasgow) (Glasgow Sch. of Arch.), 33 Merryburn Avenue, Giffnock, Glasgow. J. A. Coia, James Taylor, A. G. Henderson.

Chamberlin: Peter Hugh Girard [Final], 10 Cecil Court, Hollywood Road, S.W.10. Applying for nomination by the Council under Bye-law 3 (*d*).

Chapman: Peter Claude (Arch. Assoc. (London): Sch. of Arch.), 87 Camberwell Grove, S.E.5. Horace Cubitt, A. F. G. Stanham, H. G. Stanham.

Chester: Dorothy Edith (Miss) (Edinburgh Coll. of Art: Sch. of Arch.), 6 Southfield Terrace, Barnton, Midlothian. W. I. Thomson, A. H. Mottram, Basil Spence.

Chitty: Howard John [Special Final], c/o 39 Union Street, Inverness, Scotland. G. M. Aylwin, A. J. Stedman, N. D. Quick.

Christopherson: Austen Gerard (King's Coll. (Univ. of Durham), Newcastle-upon-Tyne, Sch. of Arch.), 52 St. George's Terrace, Newcastle-upon-Tyne, 2. Prof. W. B. Edwards, William Stockdale, P. J. Stienlet.

Clark: Ivor Maclean (Arch. Assoc. (London): Sch. of Arch.), The Cottage, Marazion, Cornwall. Stanley Hamp, R. E. Enthoven, R. F. Jordan.

Clark: Robert Kenneth, Dip.Arch. (Dist.) (Dunelm) (King's Coll. (Univ. of Durham) Newcastle-upon-Tyne, Sch. of Arch.), 19 Albury Road, High West Jesmond, Newcastle-upon-Tyne, 2. Prof. W. B. Edwards, J. H. Napper, F. A. Child.

Clark: Robert Leslie [Special Final], 21 Woodside Road, Sutton, Surrey. Thomas Eley, F. R. S. Yorke, D. du R. Aberdeen.

Claydon: John Arthur [*L*] [Special Final], 54 Phillpotts Avenue, Bedford. S. C. Jury, B. C. Deacon, Peter Dunham.

Clayton: John Cyril [Final], 21 Shanlieve Park, Belfast. R. H. Gibson, T. R. Eagar, J. R. Young.

Clothier: Geoffrey Ind (Arch. Assoc. (London): Sch. of Arch.), 13 Kensington Court, W.8. T. E. Scott, R. F. Jordan, Frederick MacManus.

Clunies-Ross: Edward Warren Dymoke (Arch. Assoc. (London): Sch. of Arch.), Woodcroft, Mount Harry Road, Sevenoaks. R. F. Jordan, A. R. F. Anderson, A. W. Kenyon.

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Ventris: Michael George Francis (Arch. Assoc. (London): Sch. of Arch.), 47 Highpoint, North Hill, Highgate, N.6. R. F. Jordan, L. H. Bucknell, R. E. Enthoven.

Vulliamy: John Sebastian Papendiek (Bartlett Sch. of Arch.: Univ. of London), 44 Lansdowne Crescent, Holland Park, W. Prof. H. O. Corfiato, S. Hyde, L. S. Stanley.

Wakefield-Brand: Charles Percy, M.B.E. (King's Coll. (Univ. of Durham), Newcastle-upon-Tyne: Sch. of Arch.), 2 Grange Road, Ryton, Co. Durham. Prof. W. B. Edwards, G. H. Gray, R. N. MacKellar.

Walker: Colin Fleetwood (Birmingham Sch. of Arch.), 91 Hagley Road, Edgbaston, Birmingham, 16. George Drysdale, Herbert Jackson, A. R. Young.

Walker: David Earle, Dip.Arch. (Glasgow) (Glasgow Sch. of Arch.), The Hermitage, South Cave, Brough, E. Yorks. Prof. W. J. Smith, F. J. Horth, H. Andrew.

Walker: Marshall (Northern Poly. (London): Dept. of Arch.), 26 Spencer Road, New Southgate, N.11. T. E. Scott, H. St. J. Harrison, Lord Mottistone.

Wall: John Victor [Special Final], 10 Merevale Road, Gloucester. L. S. Stanley, C. W. Yates, H. S. Davis.

Wallace: Kenneth Gordon, Dip.Arch. (Glasgow) (Glasgow Sch. of Arch.), 49 Kilmorie Drive, Bankhead, Rutherglen, Glasgow. G. G. McLean, D. B. Hutton, Prof. W. J. Smith.

Wearden: Clifford Kirkham, B.Arch. (L'pool.) (Liverpool Sch. of Arch.: Univ. of Liverpool), 3 South Grove, Fulwood, Preston. Prof. L. B. Budden, Donald Brooke, F. X. Velarde.

Webb: Jeffrey (Arch. Assoc. (London): Sch. of Arch.), The Hawthorns, New Road, Stourbridge, Worcs. R. F. Jordan, H. A. N. Medd, R. E. Enthoven.

Wells: Christopher Blackburn (Leeds Sch. of Arch.), The Gables, Bramber, nr. Steyning, Sussex. G. H. Foggitt, and applying for nomination by the Council under Bye-law 3 (*d*).

West: John Evelyn (The Poly., Regent Street, London: Sch. of Arch.), 69 Robin Hood Lane, Kingston Vale, S.W.15. L. A. Chackett, J. S. Walkden, B. H. Toms.

Wheatley: Peter Etherington (Victoria Univ., Manchester: Sch. of Arch.), 126a Park Avenue, Hull. W. B. Wheatley, George Williams, G. D. Harbron.

Wheeler: Harry Anthony, Dip.Arch. (Glasgow) (Glasgow Sch. of Arch.), 9 Broomfield Gardens, Stranraer, Wigtownshire. Prof. W. J. Smith, Gavin Lennox, D. W. MacMath.

White: Albert Walter Vousdon (Northern Poly. (London): Dept. of Arch.), 174 Colchester Road, Leyton, E.10. T. E. Scott, G. D. Hamilton, A. J. Fowles.

White: Desmond Ivor (Bartlett Sch. of Arch.: Univ. of London), 5 Cadogan Gardens, Finchley, N.3. Prof. H. O. Corfiato, D. du. R. Aberdeen, H. A. R. Ellis.

Whitehorn: Donald Punyer (Captain) (Aberdeen Sch. of Arch.: Robert Gordon's Tech. Coll.), 21 Inverleith Gardens, Edinburgh, 4. E. F. Davies, J. A. Ross, W. J. Taylor.

Whitehouse: Joseph Derek [Special Final], Gorse Cottage, Moss Road, Alderley Edge, Manchester. F. Chippindale, W. C. Young, Arthur Clayton.

Whyman: Peter Harold (Victoria Univ., Manchester: Sch. of Arch.), 11 Clifford Road, Poynton, nr. Stockport. Prof. R. A. Cordingley, Fred Thorpe, G. B. Howcroft.

Wigglesworth: Gordon Hardy (Arch. Assoc. (London): Sch. of Arch.), 7 Acacia Road, N.W.8. Prof. H. O. Corfiato, R. F. Jordan, A. R. F. Anderson.

Wilkinson: Frederick Arthur (Leeds Sch. of Arch.), 83 Aylesbury Road, Aston Clinton, Aylesbury. W. Illingworth, Eric Morley, W. A. Ross.

Wilkinson: Gordon Hugh (Univ. of Sheffield: Dept. of Arch.), 163 Dodworth Road, Barnsley. Prof. Stephen Welsh, H. B. S. Gibbs, H. B. Leighton.

Willcox: John Thomas [Special Final], 2 Globe Avenue, Benton, Newcastle-upon-Tyne. G. D. Harbron, G. R. Clayton, and applying for nomination by the Council under Bye-law 3 (*d*).

Williams: Harry Lyon (Aberdeen School of Arch.: Robert Gordon's Tech. Coll.), 'Thurlestone,' Cults, Aberdeenshire. E. F. Davies, D. S. McMillan, A. B. Gardner.

Williamson: Albert Edward [Final], 218 Wells Road, Knowle, Bristol, 4. G. D. G. Hake, A. F. French, T. H. B. Burrough.

Wilson: Alan Herbert (Leeds Sch. of Arch.), Morlan, Cantley Lane, Bessacarr, Doncaster. H. A. Johnson, William Crabtree, Denis Winston.

Wilson: Arthur Marton Smedley (Nottingham Sch. of Arch.), 'Wyken,' Dagmar Grove, Alexandra Park, Nottingham. C. F. W. Haseldine, C. H. Calvert, K. W. F. Harris.

Wilson: John Allen Robert (Arch. Assoc. (London): Sch. of Arch.), 23 Lincoln Road East, Peterborough, Northants. A. W. Wilson, A. W. Ruddle, H. J. Wilson.

Wilson: Stephen [Special Final], School House, Foggathorpe, Selby. G. D. Harbron, Dr. J. L. Martin, H. A. Johnson.

Winder: Norman Henry Duncan, B.Arch. (L'pool) (Liverpool Sch. of Arch.: Univ. of Liverpool), 'Eccleston,' Baskervyle Road, Heswall, Cheshire. Prof. L. B. Budden, Donald Brooke, F. X. Velarde.

Windle: Peter Darnbrough (Leeds Sch. of Arch.) 7 Glenholm Road, Baildon, Yorks. Col. R. B. Armistead, Eric Morley, C. W. C. Needham.

Wollerton: John, M.C., Dip.Arch. (Sheffield) (Univ. of Sheffield: Dept. of Arch.), 4a Endcliffe Rise Road, Sheffield, 11. Prof. Stephen Welsh, H. B. Leighton, H. B. S. Gibbs.

Wood: Beryl Helen Jenny (Miss) (The Poly., Regent Street, London: Sch. of Arch.), 64 Belmont Road, Southampton. E. C. Scherrer, J. K. Hicks, Denis Winston.

Woodhams: Joseph William Hart [Final], 48 Eglantine Avenue, Belfast. T. R. Eagar, R. H. Gibson, R. S. Wilshere.

Worley: Victor Walter (Arch. Assoc. (London): Sch. of Arch.), 25 Compton Road, Addiscombe, Surrey. A. T. Scott, Stanley Heaps, R. F. Jordan.

Wright: John (Arch. Assoc. (London): Sch. of Arch.), 94 High Street, Reigate, Surrey. H. G. Goddard, R. F. Jordan, L. H. Bucknell.

Wurr: Thomas Peter (Arch. Assoc. (London): Sch. of Arch.), 28 Seaforth Gardens, Winchmore Hill, N.21. R. F. Jordan, W. R. F. Fisher, L. H. Bucknell.

Yates: Daniel Stuart, Dip.Arch. (Leeds) (Leeds Sch. of Arch.), 4 Marlborough Avenue, Grange Park, Gosforth, Newcastle-upon-Tyne, 3. Norman Jones, Leonard Rigby, F. A. Child.

Young: Clifford [Special Final], 24 Roman Gardens, Roundhay, Leeds, 8. W. A. Banks, N. R. Paxton, G. H. Foggitt.

Young: Kenneth Mathison [Special Final], Hattonbrae, Kinnoull, Perth. G. C. Young, W. E. Thomson, R. M. Mitchell.

AS LICENTIATES (15)

Abbs: Geoffrey Frank, Technical Dept., War Damage Commission, Brooklands Avenue, Cambridge; 84 Windsor Road, Cambridge. D. H. Loukes, N. T. Myers, T. S. Shearer.

Anderson: Albert Nelson, Architect's Dept., L.C.C. County Hall, S.E.1; 25 Riverholme Drive, West Ewell, Surrey. S. H. Loweth, R. Wilson, W. J. Durnford.

Dargie: Jack Arklie, 14 Preston Avenue, Eccles, Lancs. Ernest Ogden, Benjamin Waterhouse, Sydney Moss.

Fraser: Kenneth Murray, c/o Messrs. Sam Bunton and Associates, 87 West Regent Street, Glasgow, C.2; 32 Hotspur Street, Glasgow, N.W. William McCrea, J. A. Coia, John Stewart.

Garton: Samuel James, F.S.A., Ministry of Town and Country Planning, London; 52 Chestnut Road, W. Norwood, S.E.27. W. H. Godfrey, S. E. Dykes-Bower, Marshall Sisson.

Hall: Walter Ralph Patten, c/o R. A. Thomas, Esq. (*F*), Northern Road, Cosham, Hants; 54 St. Andrews Road, Southsea. R. A. Thomas, V. G. Cogswell, A. C. Townsend.

Keyworth: Francis William, c/o Messrs. Gotch, Saunders & Surridge, Bank Chambers, Kettering; 156 Shanklin Drive, Leicester. H. R. Surridge, C. C. Ogden, Laurence Kennard.

Lawson: Philip Francis, County Architect's Dept., Kent County Council, Springfield, Maidstone; Rosser, Fauchons Lane, Bearsted, Kent. S. H. Loweth, R. T. Green, Richard Mellor.

Marriott: Basil, Council of Industrial Design, Tilbury House, Petty France, S.W.1; 8 St. Peter's Square, Hammersmith, W.6. C. H. James, J. M. Easton, M. H. Thomas.

Paice: Cyril Lawrence, Co-operative Wholesale Society Ltd., Manchester; Blencoe, High Lane, nr. Stockport. W. A. Johnson, H. T. Seward, P. G. Fairhurst.

Prop: Percival Royal, c/o Borough Surveyor's Dept., Town Hall, West Bromwich; 200 Birmingham Road, West Bromwich. A. J. Sharp, F. A. C. Maunder, and applying for nomination by the Council under Bye-law 3 (*d*).

Sparrow: Kenneth Geoffrey, M.A. (Arch.) Cantab., Building Dept., Kent County Council, Springfield, Maidstone; 4 Grove Green Road, Weavering, Maidstone. S. H. Loweth, R. T. Green, Richard Mellor.

Whiteley: Frank, B.A. (Hons.Arch.) (Mancr.), Bank Chambers, Bank Square, Wilmslow, nr. Manchester; 7 Park Avenue, Wilmslow. Prof. R. A. Cordingley, Ernest Simister, Harold Bowman.

Williams: James Isgoed, Brynmor Offices, Penmaenmawr; Morannedd, Treforris Road, Penmaenmawr. P. M. Padmore, B. P. Davies, F. A. Roberts.

Yeoman: Guy Hemingway, Ministry of Health, 39 Grove Hill Road, Tunbridge Wells; 5 Woodbury Park Gardens, Tunbridge Wells. C. J. Cable, Harold Anderson, Cecil Burns.

ELECTION: 8 MARCH 1949

An election of candidates for membership will take place on 8 March 1949. The names and addresses of the overseas candidates, with the names of their proposers, are herewith published for the information of members. Notice of any objection or any other communication respecting them must be sent to the Secretary, R.I.B.A. not later than Saturday 26 February 1949.

The names following the applicant's address are those of his proposers.

AS ASSOCIATES (14)

The name of a school, or schools, after a candidate's name indicates the passing of a recognized course.

Bridges: Frederick Peter, B.Arch. (Sydney) (Passed a qualifying Exam. approved by the R.A.I.A.), c/o Department of Labour and National Service, 39 Martin Place, Sydney, N.S.W., Australia. B. J. Waterhouse, W. R. Richardson, K. H. McConnel.

Brock: Leslie Thomas (Passed a qualifying Exam. approved by the R.A.I.A.), c/o Messrs. L. M. Perrott & Partners, 38, 40 Lonsdale Street, Melbourne, C.1., Australia. L. M. Perrott, J. F. D. Scarborough, Leighton Irwin.

de Soysa: Evan Lancelot Frederick, B. Arch. (Liverpool) (Liverpool Sch. of Arch.: Univ. of Liverpool), c/o The Government Town Planner's Office, McCallum Road, Colombo, Ceylon. Prof. L. B. Budden, Clifford Holliday, B. A. Miller.

Ferrie: James Westwater (Glasgow Sch. of Arch.), Messrs. Palmer & Turner, P.O. Box 771, Singapore. Prof. W. J. Smith, D. C. Rae, G. L. Wilson.

Louw: Nevil, B.Arch. (Cape Town) (Passed a qualifying Exam. approved by the I.S.A.A.), Keegan House, Hout Street, Cape Town. O. P. Lewis, R. F. R. Day, F. M. Glennie.

Love: Allan Rynhart (Passed a qualifying Exam. approved by the R.A.I.A.), 7 Valencey Road, Glen Iris, S.E.6, Melbourne, Victoria, Australia. C. E. Serpell, P.A. Oakley, S. T. Parkes.

Mathieson: Douglas Haig (Arch. Assoc. (London): Sch. of Arch.), 14 Pine Way, Pinelands, Cape Town, South Africa. R. F. Jordan, L. H. Bucknell, A. R. F. Anderson.

Molnar: George (Passed a qualifying Exam. approved by the R.A.I.A.), 16 Wolseley Road, Point Piper, N.S.W., Australia. Prof. A. S. Hook, Prof. Leslie Wilkinson, W. R. Richardson.

Moore: Robert Kenneth Lister, B.Arch. [Rand.] (Passed a qualifying Exam. approved by the I.S.A.A.), University of the Witwatersrand, Johannesburg. P. N. Logan, Gordon Leith, and applying for nomination by the Council under Bye-law 3 (*d*).

Roscoe-Hudson: Alan [Special Final], 8 Dan Pienaar Avenue, Florida North, Transvaal, South Africa. H. W. Smith, G. R. Hutton, T. L. Dale.

Sterne: Frederick Fritz (Passed a qualifying Exam. approved by the R.A.I.A.), 354 Toorak Road, South Yarra, Victoria, Australia. L. M. Perrott, R. K. Stevenson, C. E. Serpell.

Turok: Hillel, Dip.Arch. (Cape Town) (Passed a qualifying Exam. approved by the I.S.A.A.), 307 Union House, Queen Victoria Street, Cape Town. Prof. L. W. T. White, O. P. Lewis, C. P. Walgate.

Wessels: Theuns Jacobus, B.Arch. (Rand) (Passed a qualifying Exam. approved by the I.S.A.A.), 19 Market Street, Kroonstad, Orange Free State. Applying for nomination by the Council under Bye-law 3 (*d*).

Willsford: Philip Christian (Passed a qualifying Exam. approved by the R.A.I.A.), 37 Arnold Street, Killara, Sydney, N.S.W., Australia. Prof. Leslie Wilkinson, D. K. Turner, A. G. Stephenson.

AS LICENTIATE (1)

Tranter: Harold Leonard Egerton, corner Burke Road and Mayston Street, Camberwell, Melbourne, Australia; 41a Suffolk Road, Surrey Hills, E.10, Melbourne. W. A. Henderson, P. A. Oakley, J. F. D. Scarborough.

Members' Column

This column is reserved for notices of changes of address, partnership and partnerships vacant, or wanted, practices for sale or wanted, office accommodation, and personal notices other than of posts wanted as salaried assistants for which the Institute's Employment Register is maintained.

CORRECTIONS TO R.I.B.A. KALENDAR 1948–49

It is regretted that notification of the omission of **Mr. A. B. Gransby's** name from the Kalendar, appearing on page 564 of the October 1948 JOURNAL described Mr. Gransby as 'Arthur' Benedict Gransby. His name is **'Asher'** Benedict Gransby.

Mr. Sidney E. A. Johnson [*A*] has been elected an Associate member of the Town Planning Institute. This information was not received in time for inclusion in the Kalendar.

APPOINTMENTS

Mr. W. Alexander [*L*] has been appointed Head of the Building Department at Huddersfield Technical College, and will be pleased to receive trade catalogues etc. at that address.

Mr. Frederick H. Booth [*A*] has been appointed County Architect to the Isle of Wight County Council, and from 31 October 1948 his official address will be County Hall, Newport, I.O.W. His private address will be 'Keighley,' Stapler's Road, Newport, I.O.W.

Mr. Noel E. Campbell [*A*] has relinquished his appointment with the Hospitals Section of the Department of Health, Dublin, on being appointed Schools Architect to the County Londonderry Education Committee. He is taking up duties at the Education Office, New Road, Coleraine, Co. Derry, Northern Ireland, and will be pleased to receive trade catalogues etc.

Mr. F. W. Harper [*A*] has taken up an appointment as Deputy Chief Architectural Adviser in the Department of Public Health, Dublin, and will be pleased to receive trade catalogues etc. at the Custom House, Dublin.

Mr. S. P. Jordan [*A*] has resigned his post of Chief of the Design Section of De La Rue Insulation Ltd., with effect from 1 November, and will in future be in private practice. Mr. Jordan is being retained by the company as Design Consultant. He will be pleased to receive trade catalogues etc. at 1 Thurloe Street, South Kensington, London, S.W.7 (KENsington 8647).

Mr. Joseph M. Kay [*A*] has resigned his position as Assistant Architect with the Western Region, British Railways, to take up an appointment with the Department of Works and Housing (Commonwealth Government), Melbourne, Victoria, Australia.

Mr. Eric W. MacDonald [*A*] has taken up an appointment as Senior Planning Assistant with the County Council of the County of Lanark, and will be pleased to receive trade catalogues etc. addressed to him c/o The Town and Country Planning Department, 19 Anchingremont Road, Hamilton.

Mr. Geoffrey R. Price [*A*] has been appointed an Assistant Architect to the Northern Rhodesian Public Works Department. His address will be c/o P.W.D. Lusaka, Northern Rhodesia.

Mr. Donald G. Walton [*F*] has been appointed Architect to the Welsh Regional Hospital Board, and from 6 November his office will be Cathay's Park, Cardiff, to which all future communications should be sent.

Mr. A. Shaw Waring [*A*] has resigned his post of Senior Housing Assistant Architect in the Borough Architect's Department, Southampton, to take up an appointment as Chief Assistant Architect (Housing) in the City Architect's Department, Newcastle-upon-Tyne. His address for communications is 42 Wingrove Road, Fenham, Newcastle-upon-Tyne 4.

PRACTICES AND PARTNERSHIPS

Messrs. Clayton and Black and Partners [*F/F/L*] have taken into partnership **Mr. J. R. F. Daviel** [*L*], who will practise from the firm's head office, 10 Prince Albert Street, Brighton (Brighton 3162). Mr. Daviel is the grandson of the late Mr. C. E. Clayton, J.P., who founded the firm in the 1870's.

Mr. H. Hubbard Ford [*F*], of 24 Cornfield Road, Eastbourne, has opened a branch office at 51 Church Road, Hove 3, Sussex, where he will be pleased to receive trade catalogues etc.

Mr. J. H. Greenwood [*A*] has dissolved his partnership with **Greenwood, Richards and Partners,** of 1 Sackville Street, London, W.1, and is now in practice as **J. H. Greenwood** [*A*] at 11 Sackville Street, London, W.1 (REGent 2262), where he will be pleased to receive trade catalogues etc.

Mr. W. M. T. Parsons [*A*] has opened an office at 23 Bridge Street, Christchurch, Hants, and will be pleased to receive trade catalogues etc.

Mr. J. L. Singer [*L*] is practising at 41 Elm Way, London, N.W.10, and will be pleased to receive trade catalogues etc.

CHANGES OF ADDRESS

The address of **Mr. Dennis H. Bick** [*L*] is changed from 40 Formans Road, Sparkhill, Birmingham 11, to 28 Medlicott Road, Sparkbrook, Birmingham 11. He will be pleased to receive trade catalogues etc.

Mr. Niall Montgomery [*A*] moved in August 1948 from 6 Merrion Square, Dublin, to 27 Merrion Square, Dublin (Dublin 62072).

Messrs. H. S. W. Stone and Partners (**H. S. W. Stone** [*F*], **Clement Toy** [*F*] and **Maurice Hewlett** [*F*]), of Taunton and Tiverton, have from 25 October transferred their Taunton office from Lloyds Bank Chambers, Taunton, to 20 The Crescent, Taunton (Taunton 2916).

PRACTICES AND PARTNERSHIPS WANTED AND AVAILABLE

Partnership available in established and expanding practice in Newcastle-upon-Tyne. Experienced housing, factories and licenced premises. Limited living accommodation available. Box 190, c/o Secretary, **R.I.B.A.**

WANTED AND FOR SALE

Retiring Associate offers free 10 Volumes, bound, 3rd Series, 1894-1903 R.I.B.A. JOURNAL, also large number loose ones minus advert. matter, to any member who cares to collect in North London. Box 191, c/o Secretary, R.I.B.A.

Wanted. *Town Planning in Practice* (Unwin). Box 189, c/o Secretary, R.I.B.A.

Wanted Urgently. Pre-war mahogany T-squares, with ebony edges, in good condition, as follows: 1 double elephant left-handed T-square, 2 normal double elephant T-squares, 1 antiquarian T-square. Box 188, c/o Secretary, R.I.B.A.

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